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Agricultural & Horticultural Society

OF

INDIA.

VOL. IX.

PART I.—JANUARY, 1854, TO DECEMBER, 1856.

ORIGINAL COMMUNICATIONS.

"A body of men engaged in the same pursuit, form a joint stock of their information and experience, and thereby put every individual in possession of the sum total acquired by them all."—REV. DR. WILLIAM CAREY.

Calcutta:

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THE JOURNAL

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Correspondence on the subject of supplying India with Cotton Seed from the "Seychelles" Islands.

Extract of Letter from the HONORABLE C. J. BAYLEY,
Colonial Secretary, Mauritius.

To MR. J. JACKSON, *of Mauritius.*

I have always been under the impression that the cotton grown in India has to be renewed by the introduction of fresh seed from the United States every four or five years.

Considering that a much nearer supply might render the planters in India independent of American aid, I applied to the proprietor of one of our smaller Seychelles Islands for samples of cotton, which he gave me, and which I forwarded to Dr. Mouat, who had them examined by some Agricultural or Botanical Society there. The Society reported very favorably upon the sample, and asked for further information.

This information is contained in the letter (which I now enclose for your perusal) received from Mr. Louys, the proprietor, or part proprietor, of one of these islands.

I think you will find its contents interesting; and I should be glad if by any means you could pave the way to the adoption of a plan which I have long cherished—the purchase or hiring of some of these islands by an E. I. Company or body of speculators, for the purpose of producing cotton seeds when required in India. A *company of this kind would* import their own labour, and *would have other facilities* which no speculators resident in the Colony could possess.

Yours, &c.,

C. J. BAILEY.

To the Hon'ble C. J. BAYLEY, ESQ.,
Colonial Secretary.

SIR,—In reply to the verbal communication with which you favoured me as regards the mutual advantages which would accrue both to the Government of India and to the Seychelles Islands, from a revival of the cotton cultivation at the said islands, I beg to offer the following observations, in order that your praiseworthy object may be carried out, and if you think that my co-operation for such purpose can be of any service to you, I need hardly add that it will be most cheerfully given.

The mercantile community of this colony can do little or nothing for the advancement of your project, neither can the Chamber of Commerce, even with the information it has recently received on the subject of the culture of cotton at the Seychelles, furnish other than the most general observations respecting it; and the inhabitants of the Seychelles can be, even if desirous of giving an active and energetic aid, of little avail, inasmuch as they no longer possess the means of labour, nor have they any one single cotton plantation worthy of notice, both on the Seychelles and Almirante Islands.

Denis, or Sea Cow's Island, is the only one in the Archipelago which still retains cotton plants. I am told there are in all about 350 acres, but the greater part consists of old plants, uncultivated and indeed abandoned for the last twenty years. The sample of cotton which you forwarded to Calcutta came from these old plants, and the deficiency in the length of the staple, which justly struck the competent judge to whom it was submitted, must have arisen from the entire want of culture, and the length of time the plants had been allowed to run wild.

The old and experienced planters of Seychelles, whom I have consulted on the subject, all concur in the opinion, that the staple of the cotton-wool of Denis Island was much longer when the plant was duly cultivated than it now is after years of neglect. Indeed, it will be scarcely necessary for me to dwell on the wide difference that is invariably found to exist between careful culture of almost every plant, and the partial or complete neglect of it.

All the Seychelles and Almirante Islands are more or less fit for the growth of cotton. This plant thrives best in a marine atmosphere, and when grown in a low and sandy soil yields a silky fibre of superior quality. The flat and sandy islands of these archipelagoes possess this double advantage, their physical formation is most favorable, and their coasts yield an abundant supply of sea-weed, which constitutes a most valuable manure, but I am assured that the uplands (as they may be termed) of these islands are not so well adapted to the production of good cotton as the parts more immediately adjacent to the sea, and that, as observed in America, a wide difference must exist at the Seychelles between the quality raised there and on the uplands.

There is reason to believe that the great similarity, both in geographical situation and nature of soil, which exists between the sea islands of America and the flat islands of the Seychelles, would lead to a corresponding similarity in the quality of the cotton of the two countries, provided the same care were given to its culture. Indeed, if the traditionary recollection of the oldest inhabitants of Bourbon is to be relied on, the seed that was imported into both the sea islands and the Seychelles, originally came from Bourbon. A strong probability of the correctness of this tradition may be found in the fact, that the French, when in possession of the Bahamas imported cotton seed from Bourbon. It is therefore likely that the acknowledged superiority of the cotton there and then raised, as compared with the indigenous cotton of America, may have led to the introduction and cultivation of a similar kind both in the sea islands and throughout Georgia.

That it is the interest of the Government of India there should be a nursery close to that great Empire, under the control and protection of the E. I. Company, capable of supplying a sufficient quantity of cotton-seed to renew the plantations of India, as often as might be deemed expedient, will scarcely admit of a doubt. To be independent of the American States for such supply is alone a consideration of much importance, but I would moreover add, that in return for the benefit of Indian immigration to this Colony, (a measure as advantageous to the Indians themselves as to this Colony in general,) it would only be a just return that a plan emanating from the Mauritius should prove to be of use to that country which has rendered such services to this island.

As already stated, a low and sandy soil, constantly exposed to the influence of the sea-breeze, being more especially favorable to the production of the superior qualities of cotton, three-fourths of the area of the different islands of the Seychelles are for this reason laid aside. The remaining fourth is so sub-divided among numerous small proprietors, that it would be next to impossible to introduce among them such an organised system as could alone offer the least chance of success in any scheme of cultivation that might be proposed; and another objection would also be found in the distance of one island from another (in some cases sixty miles) which would alone be an insuperable obstacle to the self-supporting plan, should such a plan be deemed deserving of a trial.

But in order that my plan, the one I have now the honor to submit, should at least convey a correct idea of its probable success, I will put the following questions :—

1. What quantity of cotton seed is annually imported from the United States of America into the territories of the East India Company ?

2. What is the cost of these seeds delivered in India ?

3. How many acres of land are annually under cotton culture in these territories ?

4. How often do the plants require to be renewed ?

These questions will probably find no answer in this Colony, they must be referred to India, but let the answers be what they may, I apprehend there is no doubt that the Seychelles can alone furnish more seed than will be required for the cultivation of whatever quantity of land may be applied to such purpose in the E. I. Co.'s territories. The following statement is offered in corroboration of the assertion :

An acre of land planted in cotton at the Seychelles will give two crops per annum. It yields on an average of each acre 1000℔ of cotton and seed together. When these 1000℔ are cleaned, there will remain 250℔ of cotton and 700℔ of seed, the remaining 50℔ going to waste. Each pound weight of seed, will contain about 6,500 seeds; now as each acre is so planted as to contain from 1,000 to 1,600 plants, with two or three seeds to each hole, it will require (taking 1,600 plants to the acre) only one cwt. of seed to plant 950 acres of land.

Say 700℔ + 6,500 seeds 4,550,000

1,600 plantg. + 3 seeds 4,800 seeds + 950 acres 4,562,000

Estimating therefore the extent of land under cotton culture in the E. I. Co.'s territories at 200,000 acres, it would only require 210 acres of cotton plants at the Seychelles to furnish the supply required for India. This is on the supposition that the plants would be required to be renewed every year, which we know not to be the case, fresh seed being required only every third year.

acres seeds required per acre, seeds.
200,000 + ... 4,800 .. . 960,000,000
seeds seeds acres
700℔ + 6,500=4,550,000 + 210 .. 955,500,000

An experiment on a small scale was some years since made in Guzerat with seed imported from Bourbon. It was not successful, owing mainly to the ignorance and prejudices of the natives; but the Committee appointed at Bombay in 1822 to report on the merits of the produce of this seed, stated that:

"Having examined two parcels of cotton raised from Bourbon seed, we find it of a good staple and silky wool. The quality of this cotton is well calculated for the Europe market. Such a favourable result surely warrants the expectation of great success in future trials."

I am not aware that any similar trial has since taken place, but it strikes me that it would be desirable and most interesting that a further one should be entered on as early as possible, and in order that I may close this long letter by a practical suggestion, and one as it appears to me most easy of execution, I make the following proposal:

Denis Island belongs to me: it is of all the Seychelles group the island that has always produced the finest quality of cotton. The extent of it, adapted to this culture, is about 400 acres, consequently amply sufficient to supply seed for all India. It is isolated in its situation, being sixty miles north of any other island, relieved therefore from the inconvenience of neighbourhood. Its latitude 3° 50 m. S.

I propose then—

1*st*. To abandon whatever cotton there may be on this island, in order that it may be sent to India on trial.

Whatever it may realize will go to defray the small expense attending such trial. A few prisoners taken from the Seychelles would gather the cotton in a few days, and the freight to India from Mauritius, in the return cooly vessels, would be trifling or probably nothing at all. The cotton itself might not be good, but the seed would be valuable; and experienced judges could form a fair estimate of the change that would be made in its quality by careful cultivation.

2nd. In order that a more complete trial may be made of the value of this island as a nursery of seed for India, I further propose that the East India Company or any Agricultural Society from either of the Presidencies should send there an intelligent overseer and some labourers, they could then gather the cotton now on the plants, clean and pack it, they could also uproot all the old plants, and replant the whole of the island. I, on my part, would willingly make over not only the cotton now growing there, but also the two ensuing crops from the new plantations. During the time this island would be under this new system, it would be gratuitously granted by me "ensouissance," and the only stipulations I would make would be that of not destroying the few cocoanut trees that now exist upon it.

Should the foregoing experiment be found to be of a satisfactory nature, I should feel induced, subject to an agreement involving no expense whatever to the Mauritius Government, or even to that of India, to concede my property rights to this island to the Government of India.

With every apology for trespassing so much on your time, and with an offer of any additional information should you deem it necessary.

Port Louis: I have the honor, &c.,
24th June, 1853. C. Auguste Louys.

Official Papers on the Basts of Arracan. Communicated by the Government of Bengal.

OUR GOVERNOR OF THE PRESIDENCY OF FORT WILLIAM IN BENGAL.

We transmit herewith for your information, and for communication to the public in such manner as you may deem expedient, copy of a report which has been submitted to us by Dr. Forbes Royle, on the subject of the "Bast" produced in the Province of Arracan, showing the uses to which that article is applied in this country, and the prices usually obtained for it when imported from Russia. A sample of the Russian Bast Mats is also transmitted.

We are, &c.,
(Signed) J. OLIPHANT,
AND
13 OTHER DIRECTORS.

LONDON:
15*th February,* 1854.

SIR JAMES MELVILL, K. C. B.
Secretary to the Court of Directors of the East India Company.

SIR,—Having been of late much engaged in examining and showing to practical men the various fibres which were sent to the Great Exhibition of 1851, as well as those which have recently arrived from Assam, I was induced to turn my attention to the subject of Bast. Of this large quantities are imported into this country in the form of mats from Russia, chiefly for the use of gardeners, who use them for covering pits and frames, or protecting plants; and afterwards when pulled to pieces, for tying up plants and vegetables. The mats are also extensively used for packing cabinet work and furniture in general.

The subject may appear trifling, but it is calculated that about three and a half millions of mats are exported from Russia, and about 8 to 12,00,000, are annually imported into this country. They are made of the bark of the lime or linden tree, which, when stripped off, is also made into shoes, cordage, sacks for corn, &c. The linden tree is not found in India, but there are many which belong to the same family of plants found there, some of which probably yield similar products, possibly one or two of those to which I now wish to draw attention.

Among the raw products sent from the Province of Arracan, there were six kinds of Bast (which there seems to be called *Shaw*) with specimens of rope made with them. They were named : 1, Thing-lean-shaw ; 2 Patha-you-shaw, 3 Shaw-phyoo ; 4, Ngan-tsoung-shaw; 5, Shaw-nee ; 6, Eee-gyot-shaw. Observing that some of these, from their strength, flexibility and softness, were well calculated to answer the purposes of the Bast in ordinary use, I sent some specimens to Dr. Lindley, and requested him to have their useful properties ascertained in the Horticultural Society's garden at Chiswick, as he informed me that both the Superintendents, Messrs. Thompson and Gordon, reported very favorably of them. I requested the latter to give me a detailed report, including all such information as would be useful to merchants in Arracan. The kinds sent to him were, No. 2, Patha-you shaw, 3, Shaw-phyoo, and, one marked Sanseviera-zeylanica, perhaps No. 4 or No. 6.

Though well aware that the freight must always operate against a bulky article of low price brought from so great a distance, yet there are occasions when from a stoppage of, or a deficient supply from ordinary sources, a rise of price ensues, which might be taken advantage of at a place on the coast like Akyab. I would therefore beg to suggest that the accompanying report should be sent to India for the information of the merchants in Arracan, or for publication in the Journals in India. At all events a knowledge of the good qualities of these Indian Basts might lead to their employment in India, and to their export to less distant countries than England. As it is possible that merchants in Arracan might wish to make mats in imitation of the Russian, I would suggest that a piece of one of these might be sent there, as by this the thickness of the transverse, and the pliability of the longitudinal pieces of the Bast, of which they are composed, might easily be imitated.

EAST INDIA HOUSE: I have &c.,
16*th Jany.*, 1854. (Signed) J. FORBES ROYLE, M.D.

Report upon a new kind of Bast Matting from India.

HORTICULTURAL SOCIETY'S GARDENS, CHISWICK.

11*th January*, 1854.

SIR,—The three pieces of Indian Bast sent appear all the same, at least I cannot detect any difference in their qualities or appearance, and I think, when it is made into mats, will prove an excellent substitute for Russian mats. It is very strong, is in broad strands, very pliable and tough when wetted, easily divided into small portions for the purpose of tying, &c., and is entirely free from knotty places, and when worked into mats in the Russian way, will be an excellent winter covering for pits and frames; the material also seems more firm and tough, and I have no doubt will last at least twice as long (in wear) as the best Russian mats, and if sold at a less price will in time supersede them.

The price of Russian mats is now from £ 7-10 to £ 8 per 100 wholesale, and from 2*s.* to 2*s.* 6*d.* each, retail.

A full-sized Russian mat weighs about 5 lbs., when new and quite dry, is 7 feet long and 4 feet broad, and is made with the rougher and worst strands worked crossways, and the thinner and longer strands longways in the mats.

1

In making mats it should be observed, never to have any of them under the regular size, for small mats (either shorter or narrower) greatly detract from the value of full-sized ones, when mixed with them.

I remain, &c.
(Signed) GEORGE GORDON.

To DR. ROYLE,
&c., &c., &c.

One of these was marked Patha-you-shaw, another Shaw-phyoo, and a third was marked Sanseviera-zeylanica on the surface of the Bast, but the native name was lost.

(True Copies)

W. G. YOUNG,
Under-Secretary to the Government of Bengal.

Suggestions for a "Plant House." By Lieut. W. H. LOWTHER, 52*nd Regt. N. I.*

I beg to offer a few hints for the construction of a very cheap and effective "Plant House," which my experience suggests will be acceptable to most of your floricultural readers; perhaps, I may also add, to the Society itself. A residence of some years in the Punjab, and N. W. Provinces, enables me to speak feelingly of the disappointments and disasters which befall the gardener, the natural results of extreme temperature, more especially that of "cold," and I am given to understand that even in the milder winters of Bengal, such is too often the lot of the cultivator.

I therefore propose to alleviate, in a great measure, one obstacle to the success of horticulture, for the discovery of which plan, I must state, that I am deeply indebted to two excellent English works on gardening, viz. "The Cottage

Gardener," and "Annals of Horticulture;" the former contains economical details for constructing a "frame" suited to the means of the poorer classes for raising early cucumbers, &c., &c.; and the latter in its universal tendency to promote the love of flower-growing among the community, proposes that every body may have his greenhouse, by making an aperture in the back of a fire-place, and thereby admitting warm air to his collection of plants, (contained in some shed, or closet adjoining.) By combining the advantages of both methods, I think I have succeeded in establishing a greater facility of culture, than hitherto attained in the cold season, one also within the reach of the humblest votary of Flora.

I shall now proceed to describe the accompanying diagrams, executed to facilitate the workman's task.

Figure I,—exhibits an outer view of the requisite elevation on a scale of half an inch to one foot: thus the wall AA will be 12 feet long (*inside* measurement) and 4 feet high: BB will be likewise 12 feet in length, but only 2 feet in height,—thus giving an incline to the side walls CC, the inner space between these two parallel walls will therefore be about 6 feet. The angles DD support the base of the chimney shaft E, near its junction with the wall AA: a weather "cowl" FF is formed of a common water "*ghurrah*," having three apertures,—front,—right,—and left, to allow the egress of smoke, and prevent the wind from driving it back again into the flue.

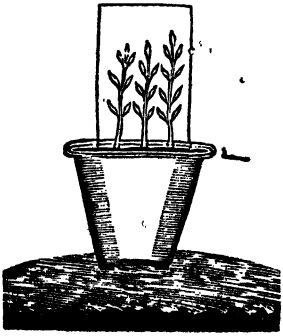
Figure II,—shews the construction of the surrounding walls and chimney: the former GG may be built kutcha, or pucka at pleasure, and should not therefore be less than one foot thick, leaving a rim, or ledge of a few inches broad to receive the wood-works of the frame. II is a moveable board or plank of painted wood, fitting exactly, and shifting so as to enable access to the plug-hole J, for insertion or withdrawal of its stopper K. This should be made of hard wood, and have a handle and tin backplate: (as in the sketch) the one to facilitate removal,—the other to seal the aperture thoroughly, when required. The plug-hole J should not exceed six inches,—every way. L the shaft must be *two feet* square (outside) near its base of junction with the angles DD., and tapering *slightly* in its ascent: the height of mine from the ground level is exactly 8 feet, (but this will vary with circumstances).

Figure III,—will give a notion of the fire-place I employ. Of course, I merely burn logs and rough billets: observe that the "plug hole" rests on the bottom of it, for the very particular reason that being always covered with hot embers, no smoke can possibly find entrance into the adjoining frame-house, (which would not be the case, if this precaution were only slightly neglected). To promote this object more fully, the chamber of the fuel receiver MM is built concave. The flue NN is exactly one foot square in the narrowest portion of its dimensions, (or at its union with the " cowl.")

Figure IV,—explains the necessary wood-work: there should be two stout timbers let into the walls, AA and BB, at about four feet apart, to receive the superincumbent weight of the frame, which ought to be constructed thus: QQ is the outer part (which will eventually rest on the ledge HH) the two main spars OO will be crossed by three minor laths PPP, the whole being secured with light iron screws. Between the spaces of these bars, (if glass be deemed inconvenient, or too costly,) tightly attach stout packthread lines, fastening them to small nails: then stretch over the entire frame, a good strong piece of calico, or sheeting, which you must fix with tin tacks, afterwards applying two coats of drying oil with a brush; this operation will render the cloth transparent and waterproof,—both very necessary qualities. I have always used newspapers, oiled as above, but cannot recommend it, as being constantly damaged by wind, hail, and feline interlopers.

For hinges I always employ loops of string, or leather, fastened to the frame-work, and carried over the back wall to iron hooks, but these "ties" are often demolished by white ants. When you require to open the "lid," (*i. e.* lift up the frame,) the best plan will be found in two notched bars, which turn on a nail, and support the two corners of the elevated portion,—fitting into grooves made for their reception.

Figure V,—is meant to show that side of the stove, which is next to the tent or room required to be heated, and which is supposed to be occupied by the individual who superintends the culture of the plants in the "frame-house." RR represents the required size, and shape of the fire-place, viz., almost a semi-circle. It is necessary to cover this front at times with a fire-guard, both to prevent accidents from falling embers, and prevent unnecessary draughts of air. I find the simple screen in the annexed (figure VI,) drawing quite sufficient for this two-fold object. Let it be of zinc, or tin perforated with a few holes, and at least 2 inches larger every way than the hearth it covers. From November till March, this little building will be found invaluable to the geranium grower, or propagator of the choicer tropical plants: it will also be considered a *sine quâ non* in the culture of cuttings, which in this temperate nursery will have become *vigorous* trees ere the trying hot months of the year commence.



In the centre of the house I made a small hot bed, in which were immersed "thimble pots," each holding two or three cuttings or a few seeds, and each was covered with a cut bottle (of clear glass) thus: I select the strongest blueish green coloured, and divide them by wrapping round the part to be cut a thread dipped in spirits of turpentine, which is then set on fire, and a drop of cold water allowed to fall on the heated part. I once warmed a frame of this kind by horsedung only, but I found the heat very unmanageable and cannot recommend it. In the present plan we can graduate the temperature to any point we please, and I suggest that a thermometer, with an index, visible from the exterior, be suspended, to assist in preserving a proper medium. I found 70° to 80° the usual standard about midnight, after which as the embers were allowed to expire, it fell some 10° or 12° but only very slowly. For the growth of tender orchids and some other plants requiring moist heat, I use steam, in the following easy manner. A common tea-kettle should have a tin tube attached tightly to the spout, (which would pass through the plug-hole into the plant house ;) when the water contained in the kettle boiled, a continuous jet of warm vapour would be sent forth, closely resembling those hot fogs of the forests from whence these beautiful ornaments of nature are brought. Perhaps also this kind of frame may prove of use to the breeder of poultry, and such a one could be attached to every farm-yard at a very low cost: it might be made a very profitable source of amusement.

On a future occasion I shall give you a paper on "Green-houses in India" as useful and ornamental buildings ; showing their construction on a larger scale, suitable as appendages to the mansions of the rich and botanical establishments.

Communication on the cultivation and manufacture of Flax, in Great Britain and Ireland; with remarks on other Fibres, and on Oils, Tallow, Cotton, &c.; addressed to the Special Committee of the Agricultural and Horticultural Society: by the Secretary.

Referring to my letter of the 25th of August last, I avail myself of the leisure which a sea voyage affords, to submit, for your information, and that of the Society, in separate memoranda, (Nos. 1 and 2,) the result of my enquiries on some of the subjects alluded to in your communication to my address of the 29th June, 1854.

The first subject I have noted down, as perhaps the most important, and consequently, that to which I have devoted most attention, is the cultivation of Flax, and its after preparation under certain recent improved processes. I stated in my former letter from Scotland, that the Committee's letter of the 29th June having reached too late to admit of my obtaining, previous to my departure from London, any particulars as to the best localities for procuring information on these points, I had addressed the Secretary of the Society of Arts, and Dr. Royle, on the subject. Owing, however, to the absence of both of these gentlemen in the country, for the summer vacation, the desired information was not received, and I was thrown entirely on my own resources. I lost no time, however, after receipt of your letter, in visiting Dundee, the great emporium of the flax trade of Scotland, (and of jute also, of which it takes from fifteen to sixteen thousand tons annually,) and placing myself in communication with the Chairman and Secretary (Messrs. Thomas Bell and Robert Sturrock) of the Chamber of Commerce of that city. I received every assistance from both gentlemen in the prosecution of my enquiries, and obtained from them letters of introduction to the Chambers of Commerce at Glasgow and Belfast, and to the manager of the Redford flax factory at Thornton near Kirkaldy. I have also to express my acknowledgments to Mr. Robert Buist, of Dundee, (who is largely interested in the flax trade,) for his attention, and for furnishing me with sundry packages, from his factory, of the raw material, as test samples for the Society's Museum. I may here remark that I saw large quantities of Riga flax being worked up at the mills in Dundee, not superior in quality to what has been, on several occasions, submitted to our Society as the growth of Bengal and Behar. Mr. Sturrock informed me in conversation, and afterwards by letter, that a larger quantity of flax of *a second-rate quality* is consumed at the various mills at Dundee and its vicinity, than perhaps in any other part of the United Kingdom. He suggested the propriety of a small quantity, say a ton, of Indian-grown flax-straw, packed as jute, being forwarded to his

Chamber, with the view of having it prepared after Schenck's process, a process which admits of the straw being kept for months before the removal of the fibre, and promised to communicate the result of the experiment, in due course, for the information of our Society, and to furnish specimens of the prepared fibre. This would not, of course, answer as a commercial speculation, but the offer appeared to me so desirable and feasible, with the view of testing whether the Indian plant, *as now grown*, can be converted into a *serviceable article, that I readily intimated my intention of bringing it to notice*; and which has been already done in my letter of the 24th October, to the address of Mr. Robinson, the Acting-Secretary. I refer again, in this place, to Mr. Sturrock's offer, in case the subject has been overlooked in the many other matters which are being constantly brought before the Society.

From Dundee I paid a visit to the Redford flax works, where, I was informed by Mr. Sturrock, I should see the late Mr. Schenck's patent hot-water system of retting, and Wilson's patent scutching machine in full operation. Mr. Wilson, the general superintendent of that and certain other flax works in Fifeshire, was absent on the occasion of my visit; but I was very politely received by Mr. Henry Jackson, the manager, who not only shewed me over the works, but explained the whole process. I had not an opportunity of seeing the plant on the field, it having been pulled and stacked ready for use sometime previous to my visit; but I obtained all the available information respecting the mode of growth, the most favorable kinds of soil, manures employed, &c., &c., from Mr. Jackson: these I have also embodied in the annexed memorandum.

My next visit was to Glasgow. In conversation with the Secretary of the Chamber of Commerce, I ascertained that Messrs. John Leadbetter and Co. of that city were the agents for the patentees of Watts's patent process of preparing flax, both in Scotland and Ireland. I had determined, in the first instance, on visiting Belfast, but the weather during my stay at Glasgow was so very unfavorable, that I was strongly recommended to delay crossing the Channel till it cleared up: but the brief period before me not admitting of this, I gladly availed myself of Messrs. Leadbetter's offer of an inspection of one of their factories, at a place called Wishaw, about 18 miles from

Glasgow; and thither I proceeded on the following day. Owing to the absence of Mr. Deans, the manager of the works, the process was not explained to me so fully as on the occasion of my visit to Redford. I am therefore chiefly indebted to notes made at the time, as also to particulars obtained afterwards, for the information detailed in my memorandum. I may here add that Messrs. Leadbetter intimated their readiness to institute experiments, after Watt's process, on a quantity of Indian-grown flax-straw. This offer has also been communicated in my letter to Mr. Robinson above adverted to.

But though unable, for the reasons already assigned, to visit Belfast, I have been in correspondence with the Secretary of the Royal Society for the promotion and improvement of the growth of flax in Ireland, and with Messrs. A. Bernard and Koch, of Cregagh Flax works, Belfast, the proprietors of Schenck's patent system. The result of this correspondence will be found in my memorandum.

From Glasgow I went to Leeds, viâ Manchester, where I had an opportunity of inspecting the works of Messrs. Peter Fairbairn & Co., but I did not, as I had been led to anticipate, see any scutching or hackling machines in their establishment, as they do not profess to make these, but machinery of a more complicated and costly kind for spinning and weaving purposes, &c.; nor did I observe, in any other part of Leeds, scutching or hackling machinery, which, in my opinion, would be suitable, at the present time, for India. Messrs. Fairbairn politely offered to afford any assistance in their power in forwarding the Society's views. They expressed their opinion that the scutching machine manufactured by Messrs. McAdam, Brothers, of Belfast, (McBride's invention is, I believe, the one alluded to,) would be better adapted for India than the more complicated kinds of Wilson and Watts. While at Manchester I was enabled, by the kindness of Messrs. William Fairbairn and Sons, Civil Engineers, to look through their establishment. The inspection was a very interesting one, but I did not observe any machinery connected with the object I had in view.

On my return to London, I was in communication with several gentlemen interested in flax manufacture. To Mr. John Clough, of Blackheath, (formerly of the firm of Atkinson and Clough, engaged in the flax trade at Leeds) and to his brother, Mr. Thomas Clough, of

Howden in Yorkshire, I am more especially indebted for much useful information on the subject. In accordance with my request, the latter gentleman has been kind enough to have a set of implements manufactured for me, such as are at present in use in that county, for the preparation of flax. These, I was fortunate enough to receive the day previous to my departure from England, and I have brought them with me. They will, I believe, prove an useful addition to the Society's stock of implements.* These gentlemen have further offered their assistance, in any way that it can be rendered, towards meeting the Society's views. For further particulars on this head I must beg reference to my memorandum.

The memorandum, No. 2, refers to China grass, plantain fibre, oils, and tallow, and other subjects of which I have treated in detail.

In conclusion, allow me to observe that, though the brief period of my residence in England, coupled with my impaired state of health, have prevented my obtaining so much information on various subjects as I could have desired, I trust the Society will give me credit for having used my best exertions to advance the objects they have in view, as embraced in the papers herewith submitted.

SHIP *Bengal* AT SEA,
November, 1854.

A. H. BLECHYNDEN,
Secy. A. & H. S.

P.S.—I have to apologize for the "getting up" of this letter and its accompaniments. They have been written at various times and under difficulties which can be best understood by those who have had any experience of the discomforts of a long sea voyage.

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* The cost to the Society will be £2-13, in all, viz.:—

For a set of implements, including 120 hackle teeth for three more hackles, ...	£1	16
Case for the above, and carriage from Yorkshire to London, ..	0	17
	£2	13

N. B.—No charge for freight from London to India, as I have included it among my luggage.

No. 1.

Memorandum on the cultivation of Flax in Great Britain and Ireland, and its after preparation under certain recent improved processes; and also according to the old system.

Notes of a visit to Redford Flax factory, at Thornton, Kirkaldy, Fifeshire.

The proper management of the Flax crop in Fifeshire.

Soil.—The soil which is considered as best suited for flax is a sound dry deep loam, with a clay subsoil. It is of the greatest importance that it should be clean, and in good condition, for the flax crop does not differ from any other crops in this respect, that, to be grown profitably, the land should be manured and well farmed. It is also very desirable that it should be well drained, for when it is saturated with either under-ground or surface water, the flax grows rank and soft, and very liable to lodge. Light, sandy, gravelly, or mossy soils, are not likely to produce a remunerative crop.

Rotation.—The best rotation is probably after oats, which has followed a green crop or old lea (meadow land, or after grass,) but flax should never be grown after 2 or 3 succeeding crops of oats. Very fine crops will probably be obtained directly after old lea and wheat.

Manure.—A certain quantity of suitable manure should invariably be given: say, town refuse, or street manure, at the rate of about 12 tons per acre; if that be not obtainable, the shortest of the ordinary farm manure will answer nearly as well. Rape-dust, to the extent of 3 cwt. per acre has also been used with great advantage, if a shower of rain intervenes between the sowing of it and the flax seed. Guano is not recommended, as it has been found to give but a poor quality of fibre, and to render the straw soft and liable to lodge. A short active manure tends to produce an equal braird, and to hasten the growth of the young plant, so that the weeds may be choked, and the land sheltered; after which, there is, generally speaking, little doubt about the crop.

Preparation of the soil.—Thorough draining is a point of the greatest importance. The land should be so well drained, that it can be sown in flats, which will give more even and much better crops. It should also be carefully and repeatedly cleaned, and the surface mould reduced to as fine a state as possible; but there is some danger in loosening the subsoil too much, for the flax plant has but a small root in comparison with the length and weight of the stalk; and, in order to keep it erect, the land should be moderately firm.

Ploughing is commenced early in autumn, and the land thrown into ridges to receive the frost and air. If the ordinary farm manure is used, it is ploughed in at this time. In spring, a light ploughing is sufficient, so as to preserve the winter surface for the roots of the flax—and the street manure is laid on at this time. This is done in March, about a month before sowing, so as to allow any seeds of weeds to vegetate, and harrowing, before sowing, will kill them.

Sowing.—Previous to sowing, a clod crusher or roller may be advantageously used, to give an even surface and consolidate the land, and this broken up again with a short toothed or seed harrow. Then sow, and cover the seed with the same harrow to the depth of an inch, and finish with a heavy roller. Riga seed has been found best adapted to the generality of soils, but should never be sown without being previously sifted through a sieve, to clear it of all the seeds of weeds. Home saved seed, one year from Riga, when changed to a different locality, produces equally good crops. The proportion of clean seed may be stated at 3 bushels to the Scotch acre, and should be sown broad cast; the sowing of clover or grass seeds, along with the flax, is objectionable, as these plants always injure the root ends of the flax.

Weeding.—If care has been paid to cleaning the seed and the soil, few weeds will appear, but if there be any, they must be carefully pulled. Care should also be taken to walk lightly over the young plants, and the weeders should walk facing the wind, so that the plants laid flat by pressure may be blown up again, or thus be assisted to regain their upright position. The tender plant, pressed one way, soon recovers; but if twisted or flattened by careless weeders, it seldom rises again.

Pulling.—If the weather continues to be fine, the crop should be well ripened before being pulled. It should not be commenced upon until the seed is getting brown, and the leaves are falling off the stalk; for if well ripened one foot, the time required to win it in the stook, and consequently the risk of damaging it, are much lessened. Too much care cannot be taken in keeping the root ends of the sheaf perfectly square like a brush, which can only be attained by keeping the left knee well forward, and pulling the plant perpendicularly. The best size of sheaf is about six inches diameter, and as small a quantity of flax should be used for the band as possible; three stalks are sufficient. "Bands of straw and rushes and hemp string are also employed for tying the sheaves, but the flax bands are most easily obtained, and sustain little damage in the usage. It is also customary to set up the flax in "wind rows," and afterwards in narrow "wind stacks," before storing or stacking it in bulk, but the ordinary plan adopted with grain crops perfectly answers the purpose, and takes less time and trouble than the above. Two binders and ten pullers should pull and stook an acre in 10 hours."

All the flax manufactured at Redford factory is raised by farmers in the neighbourhood, with whom the proprietors contract at a certain rate, (about £ 4 per ton.) Upwards of 2,000 acres were sown with flax in the county of Fife in 1854, the largest breadth yet known, and it will probably increase next year, as political events are likely to restrict the extent of supplies from abroad. As much as £16-10 per acre have been realized this year, or about £9 profit, after paying all expences: a good crop of wheat may fetch £12 per acre.

The new system of steeping has, among others, this one great advantage over the mode usually adopted in former times, viz., "that it is no longer expedient to strip off the seed from the plant "in its green state; nor is there any inducement, in order to "improve the quality of the seed, to allow the plant to grow beyond "the time when it is fit for pulling—thus at once unnecessarily im-"poverishing the soil, and deteriorating the quality of the fibre. "On the contrary, the plant may now be pulled solely with refer-"ence to its perfection of fibre, while, after it has been removed "from the soil, the seed still continues to draw nutriment from the "stalk, and fills and swells, and ripens in the stook."*

Nor is it necessary to separate the seed from the straw, nor the fibre either, immediately after pulling. These processes can be accomplished at the pleasure of the proprietor, the straw being in the meantime stacked with care. Having been previously stooked, the stacking can be commenced on, so soon as the sheaves are entirely free from damp inside and out, and the seed has become brown and dry. "Logs of wood, and thorns, and brambles, should be placed at the bottom, and the stack erected in an oblong square, in such a direction as to catch the prevailing wind on the narrow side of the parallelogram, the roots being laid at the outsides, and each quality of flax, if more than one, carefully distinguished. The stack must be thatched, and examined daily, to insure the discovery of heat, if the flax should "come" again. If heat occur, either in stook or stack, they must be taken down, and the sheaves spread out, otherwise the fibre will be irreparably injured. With ordinary care, however, and without extraordinary bad weather, this cannot happen, and in ten days the crop may be considered out of danger."†

Thus much for the cultivation of the plant. I now proceed to the preparation of the seed and fibre. The machine I first inspected is employed for *separating the seed from the straw*; it is on the principle of the rippling comb, but more complicated and on a much larger scale. I regret to find that I have lost my notes respecting this machine, and my knowledge of machinery is too imperfect to enable me to give a description from memory. It performs much more work in a given period than the ordinary rippling comb, which, I believe, will not ripple more than 16 to 18 cwt. of straw in 12 hours, whereas the machinery above referred to is capable of rippling and seeding 8 tons of straw in the same time.

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* Transactions of the Highland and Agricultural Society of Scotland, No. 37, for July 1852, p. 314.

† *Ibid.* pp. 318, 319.

The chaff obtained from the seed bolls is sold at from 2*d.* to 4*d.* per bushel. The refuse straw ("shove," or woody centre,) is used for feeding the boiler fires.

The steeping vats, (which is the next operation) are each capable of holding 6 tons of seeded straw, 600 cubic feet of vat room, as a rule, to one ton of straw. The average quantity of water per ton is about 2,500 gallons. These vats are heated by a modification of Schenck's hot-water apparatus. The straw requires to be steeped for seventy hours.

After it is taken from the vats, the straw is passed through a series of heavy-metalled rollers, which completely removes the bark or epidermis. The first roller process with cold water, the three after processes heated by *steam.* One of these series or sets of wet rollers is capable of doing three tons per day of seeded straw.

If the weather be fair, the straw is then dried in the open air: if unfavorable, in a place built expressly for the purpose, where it is dried by hot air. It is then ready for being scutched: but it can be stacked for any length of time, and is generally improved by being retained for some time.

The *Scutching Machine.*—I annex a sketch of Wilson's patent scutching machine, which is the kind in use at the Redford Flax Works. The interior of the machine consists of a cast-iron drum, with iron beaters, which works against the horizontal resisting plate. The weight of each machine is 8 cwt; it turns out about 60 lbs of fibre per diem.‡ The cost of the machine itself is £15
and five holders and key, 1 10

or complete, £16 10

I was unable to obtain the price of the other machines in use in this factory.

The tow, or codilla, I am informed, fetches about £7 per ton.

I should add that the effluvia arising from these steeping vats, is exceedingly unpleasant; and, in this respect, this modification of Schenck's is no improvement on the old plan of cold water retting.

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‡ The proportion of fibre and straw is one to ten: that is to say, about two cwt of fibre is obtained from a ton of straw.

I may as well introduce in this place a list of the specimens received from Mr. Jackson, viz :—

No. 1. A specimen of flax straw raised in the vicinity of Redford factory from Riga seed.

This is the kind of straw most suitable for the purpose of the manufacturers, viz., long and moderately fine, and of a clear yellow colour, and these conditions, they observe, can only be obtained by good farming and great attention. Clay land gives the colour, and manure the length and quality. By the application of the latter, the farmer is said to derive three decided advantages: *Length,* and consequently a greater weight per acre. *Quality,* and consequently a higher price: and the land remains in a much better condition for the succeeding crop.

No. 2. A specimen of flax raised in the same locality, and prepared in the same factory, by Schenck's patent. Flax of this quality is valued, at the present time, at from £70 @ £75 per ton.

No. 3. A specimen of seed raised in ditto from Riga stock.

Notes of a Visit to Wishaw Flax Works, in the Vicinity of Glasgow.

Watt's patent process of preparing flax is in operation at the rettery at Wishaw. Steam is the only agent employed. The process is, comparatively, simple and effective. Indeed, the whole arrangements are, for the quantity of work performed, inexpensive, and occupy but little space. The rettery at Wishaw is smaller than another belonging to the same parties at Croy, (which I did not visit as they were not then working,) but the arrangements can produce from 125 to 150 tons of cleaned fibre, about 50 tons of tow, 6,000 bushels of seed, and 150 tons of chaff, requiring about 1,200 tons of flax straw for a year's consumption. The machinery, including engine, boiler, gearing, &c., would cost about two thousand pounds.

By this process, and by the improved machinery employed, the fibre of flax can be prepared for the spinner, from the period at which it leaves the hands of the agriculturist, in less than two days. The several processes which the plant had heretofore been required to undergo by the old system, occupied nearly a month. "If is obvious therefore,"—observes a writer on this subject—"that if time be an object in manufacturing processes, and that if the saving of time be synonymous with the saving of money—the material suffering no injury by the acceleration of the method of treatment,—the saving which accrues in the cost of manufacture, and ultimately in the price of the manufactured product, must be proportionate to the increased speed of the process."

The following notes on the process are principally taken from a little paper handed to me by Messrs. Leadbetter and Co., and I can vouch for the correctness of it from personal inspection :—

The straw having been conveyed from the stacks to the large store room, is taken from thence to be rolled. This rolling is performed by two pairs of iron rollers of about 10 inches in diameter, and 18 or 20 inches in length, for the purpose of breaking the seed pods. Having been rolled in small handsfull, it is thrown on one side to another worker standing before a wheel of about 3 feet in diameter, and with about an equal breadth of periphery, armed at the ends of the radii with broad pieces of wood, not unlike the floats of a steamer's paddle. These boards strike upon the ends of the flax, and effectually remove the seeds and husks, which, after passing though a large riddle, and under a smaller roller, to be more completely broken, are then, by an endless chain of buckets, carried up to a hopper, which throws the seeds and chaff into a pair of fanners, very similar to those which in corn mills separate the chaff from the wheat ;—the husks go out in one direction, and the seeds in another.

The flax straw having been thus deprived of its seed pods, is put into square boxes, in small bundles, which boxes, being moved up and down by the constant and rapid action of short cranks and shafts, are shaken until the roots of the straws are brought to the bottom of the boxes. These bundles are then put into frames, where, by means of a strong iron compress, wrought by hand, they are brought to as small a compass as possible, and then tied into sheaves ready for the steaming chambers.

The chambers in question are of an oblong shape, 18 or 20 feet long, and about 8 feet high by 10 feet wide. They are made of iron plate, rivetted steam-tight, the bundles of flax are packed quite full into them, and as soon as the doors are firmly bolted, the flax is submitted to a process of steaming for the space of from 8 to 12 hours, according to the nature of the straw, when it is fit to be removed. There is a peculiarity in these chambers which must be mentioned. It is of course well known that when steam is thrown into a chamber of any size, condensation must be constantly going on, the water thus formed would trickle in streams down the sides of the chambers. If this were permitted in steaming flax, all the water up to a boiling heat would either pass away useless, or accumulate at the bottom of the chamber. But to provide against this, and to turn this water to account, the patentee has the ceiling plates of his chambers thickly studded over with small projecting points, at the distance of about an inch apart, and as the steam rises to the top of the chamber, it condenses, and falls in a constant shower down through the mass of flax, so that it is submitted to a process of steaming and boiling at the same time. The decoction of lint stems thus formed is drawn off into barrels, and when mixed with the husks of the flax, and with chopped straw, or other edible matter, forms, according to the opinion of Sir Robert Kane, a nutritious food for cattle. I saw a quantity of this mash in course of preparation for pigs, and they appeared to eat it with evident relish. Another economical arrangement may here be alluded to. On the top of the steam-chambers plate-iron tanks filled with water are placed, which, while the flax is being prepared, becomes heated to a degree which saves a great deal of fuel, as it is passed into the boiler of the steam-engine, which furnishes power to the machines before-mentioned, and water for certain washing purposes, and also power for other machines to be referred to.

The steaming process having been completed, the flax in bundles is removed from the chambers, and, being unfastened, is passed through several pairs of rollers, to be crushed, and have the epidermis removed. During this process of rolling, it is passed from hand to hand along a trough of hot water, and washed free from all extraneous matter, and afterwards bound with a pair of wooden clips into broad thin sheaves, when it is ready to be dried in the air in good weather, or put into drying stoves, that no time may be lost if the weather be unpropitious. This drying by stoves is not according to the usual plan, namely, the direct application of heat from furnaces, but by direction of currents of heated air, by a new arrangement of pipes and ventages.

When the flax is quite dry, it is removed to another part of the factory, where it is passed through a series of angularly fluted rollers, where the woody fibres of the plant are thoroughly broken. The broken flax is then taken to the scutching mill, where it is freed from the shove, and is then in a fit state to be carried into the loft, where it is sorted, and put up in bundles ready for sale.

From the opportunity I had of observing both the scutching mills, I think better of Wilson than Watt's. Though the latter is perhaps, equally simple, it did not seem to me to perform the work so satisfactorily as the former.

The patent process of Watt, like that of Schenck, has among others, this great advantage, that it enables the seed and chaff to be saved, which is generally lost by the cold steeping process. It is superior to Schenck's in this respect, viz., the absence of an unpleasant effluvia; the smell from the steam chambers is not in the least disagreeable, while a short distance therefrom no smell whatever is perceptible. Moreover, as already mentioned, the flax liquor is useful for feeding cattle. The husks are valued at 10s. per acre; and the value of the seed saved is estimated at about £4 per acre, making a total of £4-10. "During last year (1853) 175,495 acres of flax were cultivated in Ireland: calculating this at £ 4-10 per acre, we have *the immense amount of £ 789,727-10,* which can be annually saved under this factory system, but which was formerly lost in the flax hole." The shoves, or refuse woody matters, are also employed in these new works as fuel, whereby a great saving in coal is effected. At Croy works, only 25 cwt. of coal per week is required for an engine of 20 horse power, the difference being made up by consumption of the shoves produced there.

I add in this place, a report of the Committee of the Royal Flax Society of Ireland, appointed to institute an experimental trial on

Mr. Watt's system of preparing flax fibre from the straw. It is taken from the 12th Annual Report of that body:—

"Since attention was first directed to the improvement and extension of flax cultivation in Ireland, and an association formed in Belfast, in the year 1841, to endeavour to accomplish these ends, it has been evident that a great desideratum in the treatment of flax, in order to obtain a fibre of good and even quality, suited for manufacture, was the adoption of some plan by which uniformity could be arrived at, and the waste and loss arising from the imperfections of the system generally practised by individual growers obviated.

"In order to attain this end, it appeared requisite that a division of labour should be carried out, that the farmer should be merely the grower of the plant, and that persons of capital, education, and scientific skill should purchase it from him, and convert it by some effective process into marketable fibre.

"Every project, having this end in view, has, consequently, met with great attention from the Royal Flax Society and the public; and a plan, embodying points of great novelty, having been lately brought forward by Mr. Watt, and put in operation at Belfast, a meeting of those interested in the matter was held on 2nd October, at which the inventor was present, when it was arranged that a careful examination into the processes employed should be made by a committee then appointed.

"The trial was begun on 21st December; and although all the points desirable to be ascertained have not yet been fully investigated, the Committee are in a position to report to this meeting a number of facts already ascertained, which they consider of interest and importance.

"Mr. Watt's system may be briefly described as follows:—The flax straw is delivered at the works by the grower, in a dry state, with the seed on. The seed is separated by metal rollers, and afterwards cleaned by fanners. The straw is then placed in close chambers, with the exception of two doors, which serve the purpose of putting in and discharging the straw; the top, which is of cast iron, serves the double purpose of a top and condenser. the straw is then laid on a perforated false bottom of iron, and the doors being closed, and made tight by means of screws, steam is driven in by a pipe round the chamber, and between the bottoms, and penetrating the mass, at first removes certain volatile oils contained in the plant, and then is condensed on the bottom of the iron tank, descending in a continuous shower of condensed water, saturating the straw, and forming, in fact, a decoction of the extractive matters which connect the fibrous and non-fibrous portions of the plant. This liquid is drawn off from time to time, and the more concentrated portions are used for feeding; the process is shortened by using a pump, or such arrangement as will repeatedly wash the mass, with the water allowed to accumulate. In about 8 to 12 hours, varying with the nature of the straw, it is removed from the chambers, and having been robbed of its extractive matter without decomposition, it is then passed through rollers for the purpose of removing the epidermis or outer skin of the plant, of discharging the greater part of the water contained in the saturated straw, and, while in the wet and swollen state, splitting it up longitudinally. The straw being free of all products of decomposition, is then easily dried, and is in a few hours ready for scutching.

"In the experimental trial, personally superintended, throughout all its details, by the committee, a quantity of flax straw, of ordinary quality, was taken from the bulk of the stock at the works, weighing 13¾ cwts. with the seed on. After the removal of the seed, which, on being cleaned thoroughly from the chaff, measured 3¾ imperial bushels, the straw was reduced in weight to 10 cwt. 1 qr. 21 lbs. It was then placed in the vat, where it was subjected to the steaming processes, for about eleven hours. After steeping, wet-rolling, and drying, it weighed 7 cwt. 0 qrs. 11 lbs.; and on being scutched, the yield was 187 lbs. of flax; and of scutching, tow 12 lbs. 6½ ozs. fine, and 35 lbs. 3 ozs. coarse. The yield of fibre, in the state of good flax, was, therefore, at the rate of 13½ lbs. from the cwt. of straw with seed on; 18 lbs. from the cwt. of straw without seed; 26¼ lbs. from the cwt. of steeped and dried straw.

"The time occupied in actual labour; in the processes, from the seeding of the flax to the commencement of the scutching, was 13¼ hours, to which, if 11 hours be added for the time the flax was in the vat, 24¼ hours would be the time required up to this point.

The scutching, by four stands, occupied six hours sixteen minutes. But, in this statement, the time required for drying is not included, as, owing to some derangement in the apparatus, no certain estimate could be made of the actual time required in that process. It would appear, however, that about thirty-six hours would include the time necessary, in a well-organized establishment, to convert flax straw into fibre for the spinner.

"The cost of all these operations, in the experiment, leaving out the drying, for the reasons noted, appeared to be under £10 per ton of clean fibre, for labour, exclusive of general expenses.

"A portion of the fibre was sent to two spinning-mills to be hackled, and to have a value put upon it. The valuation of the samples varied from £56 to £70 per ton, according to the quality of the stricks of fibre sent, and the yield on the hackle was considered quite satisfactory.

"On the results of this experiment, which was necessarily of a limited nature, the committee think it best to offer no general remarks. They are sufficiently favourable to speak for themselves. It remains to be ascertained whether the qualities of flax fibre, prepared by this method, are such as to suit the spinner and manufacturer. They have been informed by a spinner who has been trying some flax prepared by Mr. Watt's system, that the yarn made from it appears equal in all respects to what is ordinarily spun from good Irish flax, of the finer sorts. They believe that, before long, information will be given by several individuals who are about to carry out more extended trials on the spinning and manufacturing departments.

"The committee conceive that the most prominent and novel feature of this plan consists in the substitution of maceration, or softening, for fermentation. In the steeping of flax, both in cold and hot water, the fibre is freed from the substance termed gum, by the decomposition of the latter; while in Watt's system the maceration of the stem loosens the cuticle and gum, which are further separated mechanically in the crushing operation, and, after the drying of the straw, readily part with the wood, under the action of the scutch-mill. Before concluding this statement, the committee wish to call attention to a very curious feature in Mr. Watt's invention. The water from the vats, in place of being offensive and noxious, as is the case with ordinary steep water, contains a certain amount of nutritive matter. This arises from its being an infusion of the flax stems, in place of holding in suspension or solution the products of the decomposition of the gum, and other substances contained in the stems. The inventor is now employing this water, along with the chaff of the seed-bolls, for feeding pigs. It is of much interest, therefore, to note in how far this may be found practically to answer, as between the seed, the chaff, and the water, by far the greatest portion of what the flax plant abstracts from the soil would thus be returned in the shape of manure. However this may turn out, the avoidance of all nuisance in smell, and of the poisonous liquid which causes some damage among fish when let off into rivers, is a matter of some consequence.

"Appended to this report is a note of the time occupied in the different processes during the experiment, and of the number of persons employed in each.

"It is to be hoped that so promising a plan may, on more extended experience, be found fully to warrant the high anticipations formed from what is already known concerning it.

("Signed on behalf of the committee),

"RICHARD NIVEN, Chairman.

" Belfast, 3rd November, 1852."

"APPENDIX.

"Note of the time occupied, and of the number of persons employed in each of the processes witnessed by the committee, on the experimental trial of Mr. Watt's system of preparing flax fibre :—

	No. of persons employed.		Time occupied.	
	Men.	Women and Boys.	Hours.	Minutes.
Seeding, ..	4	8	1	15
Placing in Vat, ..	3	4	0	15
Cleaning Seed, ..	1	0	3	0
Taking out of Vat, ..	2	3	0	30
Wet-rolling and putting in drying-room, ...	1	16	2	20
Rolling for scutching, ..	0	11	1	8
Stricking for ditto, ..	0	7	4	47
Total, ...	11	49	13	15
Scutching, ...	4	0	6	16

Before leaving this Rettery I obtained the following samples :—

1. A specimen of flax straw, raised from Riga seed, in the vicinity of Wishaw factory.

2. A specimen of flax, from the same straw, prepared by Watt's patent, and valued at from £78 to £80 per ton.

3. A specimen of seed, first year's produce, raised from Riga stock, in the vicinity of Wishaw.

Also from Messrs. Leadbetter and Co. a pamphlet on the treatment of the flax plant, with a description of Watt's process. That portion bearing on the value of the flax-plant for feeding and manuring purposes, contain facts, which are, I conceive, worthy of being reprinted. See Appendix A.

I insert here a list of the samples of flax obtained from the factory of Mr. Buist, of Dundee :—

A. Riga P. D. C. unhackled.
Average price about £35.
Present price £ 46.
A. 1. The same description hackled.
B. Russian Slanitz unhackled.
Average price about £25.
Present price £35.
B 1. The same description hackled.
C. Archangel 4th sort unhackled.
Average price about £35.
Present price £50.
C. 1. The same description hackled.

In connection with the foregoing subject, it may be as well to introduce in this place, instead of bringing it into the Appendix, copy of a letter to my address from Mr. James MacAdam, junior, Secretary of the Royal Society for the promotion and improvement of the growth of Flax in Ireland, dated Belfast, 22nd September, 1854 :—

"I am in due receipt of your letter of 20th instant, and I send you the Annual Reports of the Society for 1852 and 1853, which you will find of interest in connexion with your object of promoting the growth of flax and the economy of its fibre in India. As our manufacturers are much interested in this question, and as the description of fibre which India could produce would be so coarse as in no way to interfere with Irish flax cultivation, I have been corresponding with Dr. Forbes Royle, Mr. Montgomery, Judicial Commissioner of the Punjaub, and others, offering every information in our power, with a view to promote an object of so much importance to a large section of the linen trade, which consumes the coarse kinds of fibre. I have particularly pointed out that the present system of cultivating flax which prevails in India cannot be expected to furnish fibre in any quantity; indeed in probably so small a quantity as to make the preparation of it commercially insignificant. I have suggested the use of European seed, the introduction of the European system of culture, and the employment of intelligent persons acquainted with all the details. It would be very desirable that Government or the E. I. Company should employ some gentleman well acquainted both with the culture and preparation of flax, to go out to India, to visit all the provinces, and point out the localities where climate and soil, &c., would warrant the belief that good fibre could be produced. That if his report were favorable, there should be operations on an extensive scale undertaken to carry out the object, such as the establishment of retteries on Schenck's system, where the flax stems should be steeped, and of scutching machines, by which the fibre should be brought to a marketable state. I need not add that I shall be happy to give any further information in my power that may be required by the Agricultural Society of India."

The Annual Reports referred to by Mr. MacAdam are herewith submitted: they contain much useful and interesting information, which it may be deemed desirable to reprint, more especially the "directions for the proper management of the flax crop, compiled by the Committee of the Society," and Dr. Hodge's lecture on the flax plant. Appendix B. and C.

Observing in the Report for 1853, a favourable notice respecting M'Bride's patent self-acting scutching machine, of which MacAdam Brothers and Co. of Belfast, are the makers, I availed myself of the Secretary's offer of further information, to address him again; and asked him to procure for me a drawing of the machine in question, with full particulars respecting cost, mode of working, &c.

Messrs. MacAdam informed me in reply, that they had not any drawing of the machine, and that a sketch would convey a very imperfect idea of its mode of working: that the price of the machine, including packages, is £220, free on board at Belfast, and that they are at present making a number for different parts of the world. In order to have a complete system of machinery for scutching flax, with MacBride's machine are sent one of their own improved flax breaking machines, and some other articles, the cost of the entire system being from £280 to £300. Mr. James MacAdam, junior, states that MacBride's "machine is much the most efficient and most economical in working.."* The printed notice of the working of this machine is herewith submitted. See Appendix D.

Messrs. A. Bernard and Koch have furnished me, in reply to my application, with a pamphlet respecting the manufacture of flax on Schenck's patent system. The directions, at pages 5 to 10, respecting the erection and management of retteries, or steeping establishments, may prove useful to any persons attempting the manufacture in India under the new mode. Appendix F.

Messrs. Bernard and Koch inform me that they have some very simple machinery which they have lately made up, which they consider would be perfectly adapted for India. The machinery they allude to is for the purpose of separating the fibre in a cheap way, but by a very different manner than those in use; and its great simplicity, cheapness, facility to be worked by any one, and adaptation to either hand, or horse, or any power, would, in their opinion, be very valuable in a country like India. They stat that they keep this machinery private, but if any Company or Association were to take in hand the cultivation of flax in India, they would be willing to treat for it.

A new machine for cleaning the tow-waste of scutching mills has been lately brought to my notice, which may, at some future period form an useful addition to a flax factory in India; it has been invented by Messr. Calvert and Garnett, of Cleckheaton, Yorkshire. A description of it will be found in Appendix G.

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* A Sub-committee of the Royal Society on scutching machines, has reported favorably on the first trial of MacBride's invention, also the Secretary of the Roan Spinning Mills, Dungannon, whose communication on the subject I have inserted in the Appendix. See Appendix E.

I received from Messrs. P. Fairbairn and Co., of Leeds, maker of flax machinery, a few copies prepared by them, for private circulation, of "a concise treatise on the cultivation of flax, and on the operations and machinery employed in its manufacture." Portions of this treatise may be deemed sufficiently interesting to be reprinted, more especially that which gives a description of Schenck's hot water system of retting. Appendix II.

The mode of growing and preparing flax in Yorkshire.

For the following particulars respecting the culture and preparation of flax as pursued in Yorkshire I am indebted to the obliging kindness of Messrs. John and Thomas Clough :—

The seed is sown from the 20th of April to the 5th of May, two bushels to the acre. A light alluvial soil is the best suited for it, but it will grow on a stiffish loam, or on light sandy land; which must be well worked and harrowed till very fine, so that the surface be as even as can be made. After sowing broad-cast, harrow it once or twice across, to work the seed well into the ground. Considerable moisture in the land, or gentle rain is very desirable, to cause it to grow quick, which always yields the best crop. When it is between one and two inches high, it should be *very well* weeded; otherwise the weeds left in the ground injure the flax severely, as does also weeding it when it is longer. The plant comes to maturity in about four months. To judge when fit for pulling, it should assume a change in colour, similar to wheat; the stock should become yellow at the bottom, yet having a green appearance at the hop or boll (the seed-vessels).

To pull it, take as much as the hand will easily grasp, and draw it off the ground with as little mould to it as possible, leaving all the weeds behind, as they, if gathered with it, injure the sample of the seed. Then tie it up in small bundles (with a little of the flax), and lay it on the ground, until the top side is dry; then set it up, one bundle against the other, with the *dry* side of the bundles *inwards*, so that the side that has been laid next the ground may then get dry. It must remain set up until it is dry, and on rubbing the boll you find that the seed has attained its proper colour, and then it is generally in a fit state for beating out. This should be done on a level wooden floor with a flat beater. When it is quite clean, tie the flax up again in small bundles as before, when it may be stacked or stored away until wanted for the retting process. The greatest care must be used in opening it out, spreading it, beating and tying it up again, to keep it as straight as possible, and perfectly dry.

Retting.—Spread the straw on the ground (on a grass field) as *evenly as possible three or four stems thick, and each row three inches from the end of the other, that they may not get entangled. By imbibing the dew at night, and the sun in the day time, the bun* of the stem becomes detached from the outer skin or fibre and tender, so as to separate from it on the upper side. This may be ascertained by rubbing a few stems in the fingers, when it should easily separate. Then put a long rod under one end of the flax and turn it evenly over, so that the under side is brought to the top; and let it remain until it separates from the fibre as before noted. When the whole has become tender and perfectly dry, gather it up carefully, and make it into bundles larger than before; then stow it safely away until it is required to be manufactured.

Manufacturing Process.—Take as much of the retted flax as you can hold firmly in the left hand, by the upper or seed end of it, and with the right hand bend it over the stock close to the left hand, to break the stem well; (and it is important not to let any stem escape the grasp in any part of the process), then spread out the lower or root part like a fan; (still held firmly together by the left hand) and lifting up the breakers, or breaking machine, introduce the flax gradually betwixt the teeth, and by lifting it up and down, and repeatedly turning the flax over, break or chop it until the whole of that part of the flax is broken. After this pass it through the right hand to make it straight again; then, taking hold of the root end in the left hand, break the seed end in the same way. When sufficiently broken, take hold again of the seed end, and put it so that a small part may hang over the stock, and strike it with the swingle, so as gradually to beat the bun out of it, moving it backward and forward with the left hand in which it is held, at every stroke, until the whole of the bun is beaten out of it at that (the root) end. It must then be gently drawn through the hackle, beginning with a little at a time, and, when well straightened, take the hackled end in the left hand and draw the seed end through the hackle, as it will not swingle well without it. When well hackled lay it (the seed end) over the stock, and swingle it well until clean as the other end; then pass it through the hackle to give a finishing stroke to the whole of it. If one handful is found too small, put two together, and then after hackling it, give it a twist or two, to keep it together. The usual way of tying or making it up, is by twisting about one-third the length of the flax, and wrapping it round the other, securing the end of the twisted part, so that it will not come undone: it may then be laid and screwed into bales, the same as hemp is done.

Note.—Previous to beginning to work, the *breakers* should be placed firm on the ground, the front part a little higher than the side next the workman: and a stone should be placed between the legs, to keep it firm. In taking hold of the handle of the breakers, he must lean over it, so as to bring it close up to his left shoulder, to enable him to move his left hand, in which he has the flax, backward and forward, as it (the flax) may require, to complete the breaking or chopping of it. Should the chopping part become dull, the contrary end of the breaks may be used, by taking the pins out, and putting them in at the other end.

The *swingle stock* should be placed *firmly*, with a heavy stone on the legs of it to keep it so, and also perfectly upright. A bow made of a piece of cane, with a leather thong or piece of catgut attached to it, should project 18 inches from the left side for the swingle to fall upon, which will prevent the swingle being broken; and moreover, the spring from it assists the workman in his operation.

The *hackle* should be placed about two feet to the right side of the stock, to be ready for use, and the teeth of it must be always kept perfectly bright, or the flax will not pass through it. When not used, it should be well oiled, and the oil dusted well with quicklime, which will prevent it rusting.

There are two kinds of swingle: the one with a tail is called a "tailed swingle," and is used for dressing the finer flax; the other is called a "cleaver," and is used for dressing the rougher flax.

A few words, in conclusion, before quitting the subject of Flax. All who have had the opportunity, which I have had, of witnessing the preparation of this staple according to the processes of Watt and Schenck, cannot fail to be struck with the improvement over the old mode; and how well they are adapted for the country into which they have been introduced, and are now, apparently, working with such advantage, as to be likely, in all probability, to supersede the former system. The question in which *we* are mainly interested is, are they likely, to be as well adapted for India, if flax preparation be taken up on a scale sufficiently extensive to render the article one of commercial importance? That is to say, would it be advisable for the capitalist, or for an association, to enter on the business according to the *old* or the *new* processes? Much may be said, perhaps, on both sides. Mr. MacAdam, the Secretary of the Royal Flax Society of Ireland, is of opinion,—as will be seen from his letter given in a previous page,—that the establishment, in India, of retteries on Schenck's system, and the introduction of recently invented scutching machines, is very desirable. Others appear to be of a similar opinion, especially those who have not resided in India. Having given the subject some consideration, I cannot agree in this opinion, at least as a primary measure, though it may probably at some future time, be acted on with advantage. Taking into account the climate of India, the character of the people, and the fact that attempts hitherto made to establish manufactories requiring the use of delicate, complicated and expensive machinery, having in so many instances proved disastrous undertakings to the originators, I am, of opinion, that it would be better to commence, at least, with simple machinery, adapted for hand labor, such, for instance, as are still in use in Yorkshire, and other parts of England, similar to that referred to in a previous page, which I have procured through the kindness of Mr. Clough.* The "simple machinery" which Messrs. Bernard and Koch allude to, might, perhaps, answer the purpose, but in the absence of all details, in respect to price and mode of working, it is impossible to come to any conclusion regarding it. Mr. Wilson, of Redford factory, has also, it would appear, recently invented a small self-acting scutching machine, stated to be capable of scutching 3 cwt. of fibre per week, with the labour of two boys, to cost £15, and to give a yield greater by 10 to 15 per cent than the ordinary scutch mill. He has submitted this machine for the opinion of the Royal Irish Flax Society, but they have not, as yet, reported on it. As regards improved modes for steeping the straw, such as the hot-water system of Schenck and Watt, the question arises whether such are required at all for a hot climate. The straw which is pulled at about the commencement of the hot season, say the early part of March, could be stacked for a month or six weeks, by which period the water in tanks being of a good natural temperature—86° to 90°, should need no heating previous to the immersion of the straw. A longer time would, probably, be necessary than the period required by the new patent processes, but this would be a matter of trivial moment, compared to the difference of outlay necessary between the natural and artificial modes of steeping.*

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* This machinery is now deposited in the Society's *Museum*, for the inspection of Members and any other persons interested in flax preparation. While this sheet is passing through the press, (9th May, 1855.) the writer has had an opportunity of perusing Dr. Royle's new work on the *Fibrous Plants of India*, received by the last mail, in which, at page 216, occurs the following remark, confirmatory of the opinion advanced above. "Many

improved methods of preparing Flax have since then been discovered, [alluding to the publication, some years ago, of a pamphlet by the "Indian Flax Society,"] and are now employed in Europe, and will no doubt, be found useful in an extended state of the culture in India. But at present the simplest tools are the most suitable, such as those formerly very generally employed, and still used in many places in this country, [England] and such as are required for cleaning by hand instead of by machinery." *A. H. B.*

* In the work referred to in a previous note, *(The Fibrous Plants of India)*, I see it stated by Dr. Royle, that at the meeting of the Royal Agricultural Society held at Lincoln in July, 1854, a machine, manufactured by Messrs. Ransome, was exhibited and worked by Mr. E. Davy, of Crediton, in which Flax fibre was separated from the cuticle and boon by mechanical means, and without any steeping. It is also stated in the Annual Report for 1854 of the Royal Society for the promotion and improvement of the growth of Flax in Ireland, that,—" the plan of preparing the fibre without steeping has, on former occasions, been alluded to. It is now (Nov., 1854,) being carried out practically, on a very large scale, by Mr. Roche, M. P. for County Cork; and the fibre is stated to find a ready market in England, for certain

I have offered the above remarks on the assumption that the indigenous plant can yield sufficient fibre, to render it worthy of cultivation for that object as well as for seed. I believe it is the opinion of some, whose judgment is entitled to deference, that the nature of the plant is such that it cannot be cultivated for the fibre with much prospect of success: I am not, however, aware, if it has received *a fair trial on an extended scale;* but I do know, from the records of our Society, that experiments, on a limited scale, with foreign seed, have afforded specimens which have been favorably reported on. If, however, the yield of fibre from the indigenous plant is low, compared to those from colder countries, it is only another argument in favor of an economical method of work to cover the expenses,* and against the outlay necessary for hot water apparatus, and a series of complicated machinery. Under any circumstances, might it not be worth the while of interested parties resident, say, in Behar,—(or in other parts of Lower India) where the indigenous plant is so largely grown for the sake of the seed, to attempt the production of the fibre also, by holding out inducements to the natives to improve the cultivation, with the view of ascertaining whether the character of the plant could not thereby be improved? We know that, at present, the flax is not unfrequently intermixed with other crops, or sown outside of them in lines, and far apart,—which method, the sowing far apart, though favorable for the production of seed, is unfavorable for the production of fibre, as it has the effect of stunting the growth to a foot or fifteen inches, giving it a large branchy head, full of seed capsules, with scarcely any fibre on the stems. This present faulty system of culture might probably be remedied were the buyer of the seed to offer to purchase the straw also from the cultivator, at a certain rate per ton, on the understanding that the European method of cultivation, such as good tillage, thicker sowing, &c., were attended to, and the crop raised separately from all other "rubbee" produce. If, after a fair trial,

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coarse purposes. The price obtained is considerably under that of steeped flax, but, as the expense of steeping is avoided, it is stated to be sufficiently remunerative." *A. H. B.*

* I believe that the experiments made in certain parts of Behar, some 12 years ago, were not found to succeed, because they were conducted on too expensive a scale.

it were found that the indigenous plant possessed peculiarities of habit which could not be remedied by an improved mode of culture, then it would be time enough to see what could be effected by the introduction of foreign seed; and lastly whether the climate of the Lower Provinces of India is so entirely inimical to the production of good fibre (as some suppose), as not to be overcome by the substitution of new seed, or a better system of culture.*

No time is more favourable than the present for bringing this important subject prominently to the notice of the Indian public. The Russian war, and its effects in enhancing the cost of coarser descriptions of flax, as well as the increasing demand for this material, which has not been kept up to by the supply, has, of late, caused considerable attention to be directed, by all who are interested in the linen trade of Great Britain and Ireland, to other means of obtaining coarse fibre for a certain class of fabrics; and India has been frequently adverted to as the country from which such supplies might be obtained. It would appear from recent Parliamentary Returns,† that the total quantity of Flax imported into the United Kingdom *from all parts*, in three years, viz. from 1851 to 1853, has been 225,268 tons. Of this quantity 153,170 tons came from Russia; and the remaining quantity, 72,098 tons, (with the exception of a few tons received from Australia), was of the growth of other foreign countries. "The quantity of linseed exported from India to the British Islands, was, in 1850, 26,979 quarters, and in 1851, 93,814 quarters. In 1852 and 1853, of which we have not the tabular returns before us, it is known that the quantity was much greater than in 1851. There are no documents in our hands which shew the proportion shipped to America, but it is believed to be fully a half to two-thirds of the quantity sent to Great Britain. Supposing that the entire export to all countries during the last two years reached 200,000 quarters annually, and taking the produce, at 20 bushels per acre, it may be calculated that in the peninsula of Hindostan, 80,000 acres of flax are yearly cultivated. At the same rate of yield obtained in Europe, this breadth would produce 20,000 tons of fibre, which at £35 per ton would be worth £700,000."—*(Belfast Linen Trade Circular, August,* 1854.*)*

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* "The Indian plant, called *Ulsee* or *Tesee*, may be considered a variety which has acquired certain characters from the peculiarities of soil, of climate, and of long and peculiar culture. It is always short, probably not more than 18 inches in height, much branched, loaded with bolls, which are filled with large, ovoid plump seed. That this retains its character even in other situations, appears from a fact, of which I have been informed by Mr. MacAdam, the able Secretary of the Society for the promotion of the growth of Flax in Ireland. The Society having imported some seed for experiment from India, found that the plant did not grow beyond 14 or 18 inches. But that it is also ready to change its habit, is evident from experiments which have been made in India. I have also been informed that in a recent experiment made by Mr. Burn in Sindh, with thick sowing and irrigation, it grew at once to upwards of 2 feet. I have no doubt that with a repetition of the process of thick sowing for a few times, the Indian seed would produce plants with tall, straight, and little branched stems, each with but compatively few bolls and seeds."—(*Royle's Fibrous Plants of India.*)

† "Returns of the total quantities of Flax and Hemp respectively imported into the United Kingdom in each year from 1801 to 1853, ordered by the House of Commons to be printed, 26th June, 1854."

In connection with the foregoing statistics and extract, bearing on the utility of economising the fibre of the flax plant, as now generally cultivated in India, I beg to add another extract from a letter to my address from the Secretary of the Dundee Chamber of Commerce, as encouraging to parties desirous of entering into the speculation.

" It must be borne in mind, that if, on account of the hot climate, the finest flax cannot be raised in India, still there is such a range in the linen trade, that *almost any description of flax,* if cheap enough, can be used. Russian* and Prussian Flax, which, would be of no use in Leeds or Belfast, is consumed regularly in Dundee,

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* The majority of the samples I have received from Mr. Buist, as detailed in a previous part of this memorandum, are, I believe, of similar quality to specimens in the Society's Museum, raised by Messrs. Wallace and Leyburn, at Monghyr and Arrah.—*A. H. B. Nov.,* 1854.

Since the above was written, I have had an opportunity, on resuming charge of my office, of examining the specimen of flax submitted last year by the Agricultural and Horticultural Society of the Punjab. It appears to me to be equal to the best of the Russian specimens, noted above, and superior to most of them. The favorable report by the Fibre Committee of the A. and H. S. of India on this flax will be found in another part of this volume.—*A. H. B. May,* 1855.

Arbroath, Kirkaldy, Montrose, &c., &c. As India is distant, and the freight must be a heavy charge, it would be of importance to have it *well cleaned*, so as not to pay expences on what is useless, but in all cases this (being well cleaned) ought to be paid attention to, as it will not only repay the producer, but likewise take the market better."*

It has been suggested to me by Mr. Clough, that the tow of the flax could be turned to profitable account in India, if made into bags for packing linseed, which bags could be readily sold in England, independently of the seed.

No. 2.

Memorandum regarding China Grass, Plantain Fibre, Oils, Cotton, &c., &c.

China Grass.—I availed myself of the opportunity, while at Leeds, to call on Messrs. Marshall and Co., of that town, in the hope that I might be able to obtain some practical information respecting the speediest and most economical mode of removing the fibre from the stalk of the *Bœhmeria nivea.* In this I was disappointed. Messrs. Marshall have paid considerable attention to this fibre, with the view of bringing it into general use for a variety of purposes; but their processes are applied solely for the preparation into thread and cloth of the raw fibre in the state in which they receive it from China. They had not, they informed me, instituted any experiments on the "Rheea" of Assam, but would willingly do so, on being furnished with a supply of the stalks, and gladly submit the result of such experiments to the Society. This offer has been communicated in my letter to Mr. Robinson of the 24th of October, 1854. Among the specimens shewn at the Great Exhibition of 1851, of the different stages of preparation, dressing, and manufacture of China grasses, the jury considered the series exhibited by the above firm, the most suitable for manufacturing purposes; and they add:—" This house is deserving of great commendation for the trouble and expense it has incurred in testing the utility of this material." I allude to this fact, to shew that any experiments the Society may wish to have instituted with the "Rheea," will probably receive justice at the hands of Messrs. Marshall and Co. I annex a list of specimens (submitted herewith) of the raw material (China Grass) in different stages, which they presented to me :—

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* "It is certain that all hot countries, or those which, like Russia, have a short, warm summer, cannot furnish fine flax fibre; but it is precisely coarse fibre that is now so much wanted. The bulk of fine flax used in the linen manufacture is trifling compared with the coarse. A Belfast or Leeds mill of 5000 spindles will consume only 200 to 250 tons of flax annually; while one of the same size at Dundee or Kirkaldy, will consume 1000 to 1200 tons. Belgium, Hŏlland, France and Ireland can supply all the world with fine fibre; but Russia and Egypt cannot keep pace with the demand for coarse." —*Extract of a letter from Mr. MacAdam to Dr. Royle, quoted in "The Fibrous Plants of India."*

No. 1.—Prepared from the raw fibre into a state of floss.
No. 2.—The same after being hackled.
No. 3.—The same made into thread.
No. 4.—The same in a bleached state.

The thread, it will be observed, is finer and more lustrous than that made from flax.

Plantain Fibre—Another vegetable fibre—that of the Plantain,—has also engaged my attention. A gentleman, (Mr. J. B. Sharp,) with whom I was in communication on this subject, just previous to my departure from London, has very recently taken out a patent for the invention of improvements in obtaining and preparing the fibres of Plantain, and certain other vegetable substances, for manufacturing purposes. A copy of the specification, with drawings of the implements to be employed, has been obligingly furnished to me by Mr. Sharp, which, with specimens of "Plantain paper," also received from the same gentleman, are now submitted to the Society. Mr. Sharp informs me that the Company which has been formed to work out this patent, intend commencing operations in the first instance, in the West Indies, but will probably, extend them, afterwards, to the East. The experiments of Dr. Hunter, at Madras, and others, shew the various purposes to which the stem of the Plantain might be applied, instead of being allowed, as at present, to rot on the ground after the fruit has been gathered. On a rough calculation it is stated that each tree will yield about 4lbs of fibre, or 12,000lbs per acre. But, independently of a good fibre, a large quantity of towy matter can be obtained admirably suited, when mixed with rags, to the wants of the paper manufacturer, as the specimens above referred to, and finer specimens which I have had an opportunity of inspecting through the kindness of Dr. Royle, will shew. Any one who has paid the least attention to the subject must be aware that, to secure any additional cheap materials for paper making, is always an important object; but more especially so at the present time, when the supply of rags in the United Kingdom is less than *it was twenty years ago, while the manufacture of paper has considerably* increased, and is annually increasing. It would appear from recent parliamentary returns, that during the last four years (1850-53,) England has *imported from foreign countries* an *annual average of 8,000 tons of* rags, and *this too in the face of rags produced by a population* of upwards of 27 millions of inhabitants in Great Britain and Ireland, and notwithstanding the large quantities of bagging and other descriptions of linen and cotton wrappers, old sails, cordage, and old navy stores, &c., &c., which are bought up. From a paper handed me by Mr. Sharp, I beg to introduce the following extract on this subject: —"Much dependence cannot be placed upon foreign supplies of rags. The total importation is, at best, but a small per centage of 110,000 or 120,000 tons, which is the entire consumption of material for paper in this country. And of this small supply, we are, to a great extent, deprived by the Americans, who are buyers in our market, to supply the deficiency to which the paucity of their own production exposes them. * * * * Taking next, our own increased consumption of paper, it will be seen by the following statement, what are the details, and what the progressive advance in the production and consumption of paper in this country:"—

(Here follows a statement which I need not introduce.)

He then goes on to observe:—

"It will here be seen, that in less than 20 years after the equalization of the duty, by the reduction of that on first-class paper from 3d. to 1½d. per pound, 'the quantity brought to charge was more than doubled; that made in the last 5 years averaging annually above 80,000,000lbs over that of the 5 years preceding the reduction; and the make of last year was nearly 107,000,000lb in excess of the first 5 years' average; and more than 23,000,000lbs—above 10,000 tons—higher than that of the preceding year, 1852. Nor is this the limit of the question. By official accounts for the present year, it appears that, notwithstanding the large and unprecedented augmentation of last years' production, the first quarter of the present year (1854) exhibits an addition to the quantity made in the corresponding quarters of last year, of nearly 3,000,000 ℔s, or at the rate of above 10,000,000℔s per annum; equivalent to about an additional 5,000 tons of paper."

The above extract shews forcibly the expediency of furnishing the paper manufacturers of England with supplies of raw materials from our Colonies to meet the rapidly increasing demand for so indispensable a requisite of civilized life: and it is satisfactory to *know that we possess in the plantain,* and other of our Indian white fibrous plants, such as the aloe, pine-apple, &c., large resources of raw material for that purpose, needing only skill and capital to turn them to profitable account.*

In accordance with the intention communicated in my letter to Mr. Robinson of the 24th July, 1854, I beg to announce having presented to the Society of Arts, on behalf of our Society, certain specimens of oils, as detailed in the margin, with a paper descriptive of each, for publication in their Journal. This may cause attention to be drawn to them, and thereby lead to further enquiries from persons interested in such products. The following

OILS AND TALLOW.

1. "Ramtil." Verbesina sativa.
2. "Jychee." Euphorbia Jychee.†
3. "Desee Akroot." Aleurites triloba.
4. "Junglee Badam." Sterculia fætida.

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* Since the above was written, I have read an account, in *Hooker's Journal of Botany*, for Jan., 1855, extracted from the *Antigua Weekly Register*, of the 24th October, 1854, of a machine for cleaning the plantain fibre. This machine, the invention of the Honorable Francis Burke, the Puisne Justice of Montserrat, is reported to be most simple in its operations, and of most moderate cost: two most important recommendations. A fuller account of it, extracted from the above-named newspaper, will be found in the Appendix. —*A. H. B.*

† I have given it the specific name "Jychee," for the present, as I believe it to be an undescribed species.—*A. H. B.*

extract from the Reports by the Juries of the Great Exhibition *on the oil series* is so appropriate to this subject, that I make no apology for introducing it in this place:—

"Among the oils exhibited (of which there is a very great number,) there are several which are admirably suited for various purposes, but which, nevertheless on account of their juice, depending, generally, on local circumstances, such as cost of freight, &c., are very little, or not at all, used by our manufacturers. The knowledge, however, that such oils may, at any time, be procured in large quantities, is *of great practical value; because, not only is it possible that, by the introduction of improved machinery, or by increased facilities* of conveyance, their price may be reduced; but the very existence of such substances tend to equalize the market value of those oils now generally employed;—and should at any time, accidental circumstances cause the price of the latter to advance, these substances would then be most advantageously introduced, and would, probably, ere long, altogether supersede the oils in the place of which they had been originally imported. Thus the price of tallow is, to some extent, regulated and kept in check by that of palm and cocoanut oil; and should the value of the latter oils at any time rise, there are a number of other solid vegetable oils, equally good for all practical purposes, which, with a very little trouble, might be had in almost any quantity. There are however, some special purposes in which oils are used, for which it would not be so easy to find good substitutes; such, for example, as the lubrication of fine machinery, and the operations of the wool-spinner. It is probable that among the numerous little known oils of tropical countries, there may be many as well suited for both of these purposes as those now generally employed; good specimens of new oils are, therefore, always of considerable practical interest. Whilst, on the one hand, it is desirable to draw the attention of manufacturers and consumers to the numerous foreign and colonial oils not at present imported into this country,—it is at the same time also useful to point out how greatly the value of such oils depends on the care bestowed on their preparation, especially as regards cleanliness of the seed, and the exclusion of impurity of all sorts in the process of extracting the oil."

Previous to transferring the oils, above referred to, to Mr. Foster, the Secretary of the Society of Arts, I shewed them to Mr. G. F. Wilson, the Managing Director of Price's Patent Candle Company, who, I was informed by Dr. Royle, (who favored me with a letter of introduction) took considerable interest in all such products ;— this I found to be the case. Mr. Wilson was more particularly struck with the oil of the "Junglee Badam," which was quite new to him, and I believe it to be altogether unknown in England : it is not included in the large collection of foreign oils submitted at the Great Exhibition. He expressed a desire to experimentalize on it, if furnished with a quantity sufficiently large to admit of his doing so. Mr. Wilson further intimated his readiness to report on any description of oils respecting which the Society may from time to time be desirous of obtaining really practical information, in regard to quality, value, useful properties, &c., &c. I would take this opportunity of expressing the gratification I derived from an inspection of the works of Price's Patent Candle Company at Vauxhall, which was alike interesting and instructive. This company, I may observe, possess very large establishments, consisting of five distinct manufactories, besides plantations of cocoanut trees in Ceylon. With a capital but little short of half a million sterling, and employing 800 work people, they divide annually in profits a sum equal to the gross returns of some of the largest continental works, between £40,000 and £50,000. I beg to submit a candle, which I received from Mr. Wilson, as a specimen of the quality his company supply at 10½d per ℔, for comparison with those of Indian manufacture. I believe the candles prepared a. the Cossipore factory by Messrs. Sainte Brothers are about the best manufactured on this side of India, the cost of them is, I understand, 10 annas (say 1*s.* 3*d.*) per ℔.*

In connection with the above subject, and under the impression they may prove useful, I will close this section with a few observations respecting tallow, for which I am indebted to Mr. John Clough:

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* I have also included in Appendix J, a printed letter from the same gentleman (Mr. Wilson) to the address of Sir William Hooker, treating on oils in general ; and furnishing a few useful hints for travellers in foreign countries in respect to their comparative value. These hints may prove useful to correspondents of the Agricultural and Horticultural Society of India.

"We import annually from India two millions of ox and cow-hides, salted and brined, wet and dry, independent of all tanned and otherwise dressed; also of all sheep and goat skins. From this multitude of animals we have had hitherto little or no tallow. What becomes of it? Our small-sized cattle produce from 1 cwt. to 1½ cwt. each; but allowing only half a cwt. for the two millions *slaughtered** in India, it would give 50,000 tons of tallow, which is full two-thirds the quantity that we import from Russia and other countries. It is now selling at 66*s* to 68*s* per cwt., yet scarcely any reaches us from India. The quality of what has come only requires care to send it in a *clean state*, to make it fully equal, if not superior, to any imported.† The process of melting it is very simple, viz., let all the fat part of the animal (from intestines as well) be cut off as soon after death as possible, and hung up to cool, but no risk to be run of getting putrid. Then cut in small pieces, and gradually heat it in a pan, (an iron one is the best, being less liable to burn), as the color is of the first consequence in the operation. As soon as it boils, take off the melted fat with a tin dish or pan, pouring it though a wire sieve (not copper wire) into a vessel to cool; and continue taking the fat as long as any can be got, not discolored by the fire. Put aside the dregs for a future melting, when, by additional fire, more tallow may be had from them, and, although of inferior quality, will bring in this market within 5*s*. to 10*s*. per cwt. for the best quality, for making soap. Here, after all the tallow is got from them, they are put in a square press, extracting what remains in them, and when cool the press is emptied of the square cake remaining in it, and sold for feeding dogs, poultry, &c. under the name of "*graves*," and now worth 12*s*. to 15*s*. per cwt. The tallow is better in both cases to be re-melted in a pan having water *at the bottom* of it, which, after gently stirring and cooling in the pan, a little will draw any impurity that may remain in the tallow to the bottom of it, betwixt it and the water. Then with the tin pan with the handle, gradually take as much tallow as you can, without disturbing the impurity at the bottom of it, and pour it into the cask or case intended for it to be exported in. It is desirable to case each package round and at the bottom with a coating of the tallow first, to prevent any running out at the crevices, and not to put the tallow too hot into the packages. Let the water and impure tallow stand to cool in the pan, and when set, it may be cut out, and the impurity scraped from it, and may then go in the next boiling or melting."

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* A comparatively small number are slaughtered; a large proportion die of disease, and their carcases are lost for the purpose of tallow.—*A. H. B.*

† In a letter dated 31st. Jan., 1855, Mr. Clough writes, "the prospect of peace has caused tallow to fall in price. At a public sale last week, E. India sold for 55*s*. per cwt., *best* Russian only 54; thus you will see which of the articles was preferred by the trade."—*A. H. B.*

ROOM DYE OF ASSAM.

The specimens of this dye (the produce of an unnamed species of *Ruellia*) and cloth dyed from it by the Assamese, which were submitted to our Society by Major Hamilton Vetch, have been transferred by me to the Society of Arts, with a brief notice regarding them for publication in their Journal. Mr. Foster has promised to endeavor to obtain and report to our Society an opinion on the probable value of this dye in the English market.

SPECIMENS OF VEGETABLE FIBRE.

1. "Rheea" of Assam. *Bœhmeria nivea.*
2. "Mŭddár." *Calotropis Hamiltonii.*
3. "Jubbulpore Hemp." *Crotalaria tenuifolia.*

I have also transferred the samples of vegetable fibre, noted in the margin, with a short communication respecting them, to Sir W. Hooker, for deposit in the Museum attached to the Royal Botânic Gardens at Kew; which Museum and Gardens I took an opportunity, during my brief residence in London, of inspecting, and with which I was much gratified. The specimen of "Jubbulpore Hemp" is, I believe, new to the Kew Museum; at least I did not remark any of it: though it is not altogether unknown to the commercial world, a small quantity having been forwarded to the English market by Mr. Williams of Jubbulpore, which realized £28 per ton.

COTTON.

While at Manchester, I had interviews with several gentlemen who are much interested in the cotton trade of India; among others with Mr. Bazley, President of the Manchester Commercial Association; and brought to their notice certain specimens of the staple raised from foreign seed in various parts of the country. Of these Mr. Bazley formed a favourable opinion, but more especially of some cotton grown in the vicinity of Calcutta from Sea-Island seed, which, he remarked, was admirably suited for their purpose, and would always command a good price. He expressed his readiness to pay a fair price for any cotton of good quality raised in India; and moreover, intimated his willingness to receive and report on any samples of cotton the Society might send him.* From Mr. Bazley I received the following specimens, which are herewith submitted, viz.:—

No. 1. Sample of Sea Island cotton, valued at 2*s*. per ℔.

No. 2. Sample of Australian cotton, raised at Melbourne, valued at 2s. 6d. per ℔.

Mr. Bazley is of opinion that seed of the above stock, No. 2, originally of Sea-Island description, would succeed better in India than seed imported direct from the United States.†

VEGETABLE, FLOWER, AND OTHER SEEDS.

The result of my personal communication with Mr. Carter of Holborn, having been already detailed in my several letters to Mr. Robinson, I need not now enlarge on it. I trust the Hop seed and *white* Flax seeds, which I requested him to forward to the Society by an early opportunity, have reached in good condition, as also the grass seeds presented to me by Mr. McNab, the Curator of the Royal Botanic Garden at Edinburgh, and by Messrs. Lawson and

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* The Society have already acted on this offer, by sending a portion of the fine cotton recently raised in their garden from Sea Island seed from Seabrooke's plantation, in Eddisto Island, Charleston, S. Carolina.—*A. H. B. May*, 1855.

† Mr. W. Blundell, of the Firm of Leach, Rawson & Co., of this city, has placed the Society in a position to test this opinion, having recently presented them with a good quantity of this particular description of seed for general distribution.—*A. H. B. May*, 1855.

Son of the same place. I may mention, in respect to the *white* Flax seed, that it is stated to have been discovered by Sir R. Schomburgh in the course of his travels in Guiana, growing on the banks of the river Orinoco; the plant is taller than the ordinary blue flowered variety cultivated in Europe, and is said to produce a finer and whiter fibre.*

Having also acquainted the Society in the lengthy memorandum enclosed in my letter to Mr. Robinson of the 19th of August last, of the result of my visit to Messrs. Lawson and Son's seed stores, and extensive nurseries in Edinburgh, there is no occasion to recapitulate what has been advanced, except to reiterate my opinion that it will prove advantageous to the Society, to indent on that firm for annual consignments of vegetable seeds, and also of agricultural seeds of certain descriptions.†

COMMISSIONS EXECUTED.

I trust the arrangements I have made for a new medal die, gold and bronze medals, and galvanized iron wire, bell-glasses, and cast iron labels for the use of the Garden, will meet the approval of the Society. All details connected with these commissions have been incorporated in my several communications to Mr. Robinson, the Acting-Secretary.

PLACES VISITED.

I should observe that I have taken opportunities of visiting as many gardens, exhibitions, &c., as my brief residence has admitted, with the view of acquiring information which may prove serviceable in my capacity as Secretary of the Society. Among others I may note the following:—

1. The Garden of the Horticultural Society of London, Chiswick.
2. The last Horticultural exhibition of ditto, for 1854.
3. The Garden of the Royal Botanic Society of London, Regent's Park.

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* A small portion of this seed germinated very freely in the Society's garden in January last. The rest has been reserved for a better trial in Nov. next, which is the proper time for sowing in Bengal.—*A. H. B. May*, 1855.

† The Society have acted on this recommendation,—*A. H. B. May*, 1855.

4. The last Horticultural exhibition of the Royal Botanic Society of London, 1854.
5. The Gardens and Museum at Kew.
6. The Crystal Palace and Gardens.
7. The Garden and Museum of the Royal Botanic Society, Edinburgh.
8. The Experimental Garden of the Horticultural Society, Edinburgh.
9. The Nursery Gardens of Messrs. Peter Lawson and Son, Edinburgh.
10. The Museum of the Highland and Agricultural Society of Scotland, Edinburgh.
11. The Nursery Gardens of Mr. Turnbull, Perth.
12. The Nursery Gardens of Messrs. Peter Drummond and Sons, Stirling.
13. The Agricultural Museum of ditto, ditto.
14. The Gardens attached to Drummond Castle, the seat of Lord Willoughly D'Eresby, Crieff.
15. The Gardens at Shrublands, Coddenham, Suffolk, the seat of Sir W. Middleton.

Analytical Index to the Transactions and Journal of the Society.

I beg to submit, in conclusion, an analytical index to the Transactions of the Society, Vols. 1 to 8, and to the Journal, Vols. 1 to 8, as far as yet published. This Index has been prepared during my passage from India and back. I trust the Society may consider it worthy of publication. It has been made under the impression that it will prove serviceable to members and the public at large, who may be desirous of consulting these works for the various interesting, and, in many instances, important papers which they contain,—contributions to the Society during the last thirty years.

APPENDICES.

APPENDIX A.

Value of the Flax Plant for Feeding and Manure Purposes.

Flax liquor by Watt's process. Report by Professor Anderson of Edinburgh.

I have examined the flax liquor, and I find it to contain, in the imperial gallon, the following :—

Total Solids,	108·1	grains.
Inorganic Matters,	357·5	,,
Of which Phosphates,	17·0	,,
Nitrogen and Organic Matter,	14·7	,,
Corresponding to Proteine Compounds,	93·3	,,

In its composition, then, this liquor may, perhaps, be best compared with distillery dreg; but it is difficult to make an accurate comparison, as the latter varies so much in the amount of solid matters which it contains, being sometimes much poorer, sometimes much richer, than this fluid.

At a meeting of the Chemico-Agricultural Society of Ulster, held on Friday, the 3rd December, 1852, Dr. Hodges gave an analysis of the liquid obtained in Watt's Patent Flax Process, and an account of the new process of preparing flax, patented by Messrs. Watt & Leadbetter, which, he said, offered the only practical method of economising the matters which are separated from the flax plant in its preparation for the manufacturer, which had hitherto been proposed. The liquid which remains in the flax vats employed in the new process possessed none of the disagreeable qualities of the ordinary steep-waters. It was free from smell, and in taste and colour somewhat resembled an infusion of senna leaves. It was, in fact, a strong tea, containing, unchanged by fermentation or putrefaction, the soluble matters of the stem of the flax plant. It was, at the present time, advantageously used at Messrs. Leadbetter's works in feeding pigs. As it was desirable *to ascertain the exact composition of this liquid, and its nutritive value, he had procured a sample of it from the Bedford-Street works, and* had it submitted to chemical examination. The following were the results :—One gallon evaporated to dryness gave :*—

Of organic matters, ...	353·97	grains.
" Earthy and saline matters, ...	163·83	„
Total amount of solid matter, ...	517·80	grains.

The organic matters afforded, on analysis, 14·79 grains of nitrogen.

The earthy and saline matters were found to possess the following composition :—

Composition of the ash of the steep-water of Flax.

	Per cent.	In a gallon.	
Potash, ...	27·17	44·63	grains.
Soda,..	3·18	5·12	„
Chloride of sodium,..	21·58	34·61	„
Lime,..	5·91	9·49	„
Magnesia, ...	4·60	7·40	„
Oxide of iron, ...	0·83	1·33	„
Sulphuric acid,.. ..	15.64	25·11	„
Phosphoric acid, ..	5·66	9·01	„
Carbonic acid, ...	12·43	19·96	„
Silica, ...	3·00	4·83	„
	100·00	161·49	

Dr. Hodges stated that the flax liquid possessed considerable feeding qualities.

Flaxseed, Capsules, &c.

The following is reprinted from the proceedings of the Royal Flax Society. To many parties turning their attention to flax for the first time it may be new :—

Report of Analyses of Different Products of Flax, by Sir Robert Kane.

The question of the utility of the husks of the seed-vessels of the flax plant, as food for cattle, having become of considerable practical importance in Ireland, especially with regard to the methods of treatment of the plant recommended by the Flax Improvement Society, I

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* This liquor may be drawn off at any degree of concentration required.

was commissioned by that Society to ascertain, by chemical analysis, the constitution of those husks, so far as related to those elements on which the nutritive value of articles of food is usually considered to depend, and to report how far, according to my opinion, those materials really possessed nutritive properties.

It appeared, however, on commencing this investigation, that the examination simply of the husks of the seed vessels would lead but to unsatisfactory and limited results, and that it would be much preferable to connect, with that examination, the analysis, under a similar point of view, of the flax-seed, as well as of the pressed cake remaining of the seed after the extraction of the oil; and, further, to examine the seed-vessel, considered as a whole, as it is separated from the plant by rippling, containing its seed—in which state it is also frequently employed as food for cattle.

The process adopted in the analysis of these bodies was to ascertain, with the utmost accuracy, that the present condition of science admits, the proportion of nitrogen, of inorganic ash, and of phosphoric acid, which they contained. It is known that, in every organic substance used as food, there is abundance of carbon and hydrogen for the wants of the animal consuming it, whilst in the atmosphere there exists an unlimited supply of oxygen. The nitrogen, to supply the materials of the muscular and albuminous tissues of the animal, and the phosphoric acid, and the earthy materials of the ash, requisite for the constitution of the animal's bones, are therefore, really the substances whose quantity determines the value of an article of food; and by determining these, it is hoped that the objects of the Flax Improvement Society, in having these analyses carried on, will be satisfactorily attained.

It is not necessary here to enter into any details of the modes of analyses employed. They would be interesting only to practical chemists, and would, in fact, lead to details and discussions far beyond the limits of a report like the present, as it was found indispensable, in the course of these analyses, to discuss the value of different processes proposed by eminent chemists, and to abandon some that had been hitherto believed to be trustworthy. This circumstance, which obliged me frequently to revise the experimental results, has been the cause of the delay in making this result.

A.—Seed-vessels of Flax Plant, including the Seed.

These seed-vessels having been dried, at the temperature of boiling water, were incinerated. From 100 parts, there were obtained 8·80 of ash. It was found that 100 parts of this ash contained 4·41 of phosphoric acid, and that hence the quantity of phosphoric acid in 100 of the seed capsules was 0·39.

It was found that 100 parts of these capsules, with seed, contained 1·80 per cent. of nitrogen.

B.—Husks, or Bran, of the Seed Capsules.

These husks having been dried at the temperature of boiling water, it was found that 100 parts gave, on incineration, 6·54 of ashes, and that 100 parts of this ash contained 5·74 of phosphoric acid. Hence, the quantity of phosphoric acid contained in 100 parts of the husks was 0·38.

It was found that 100 parts of the capsules, without seed contained 1·5 per cent. of nitrogen.

C.—Flax-Seed.

This seed, dried at 212 degrees, but without losing any oil, was found to give, from 100 parts, 5·18 of ash. The quantity of phosphoric acid derived from 100 parts of this ash was 9·05; whence it results that 100 parts of the flax-seed contain 0·47 of phosphoric acid.

100 parts of the seed were found to yield 1·81 per cent. of nitrogen.

D.—The Linseed-cake remaining after the expression of the Oil from the Seed.

After drying at the temperature of boiling water, this material yielded, from 100 parts, 8·67 per cent. of ash, and this ash gave, from 100 parts, 9·32 of phosphoric acid. The linseed-cake contained, therefore, in 100 parts, 0·81 of phosphoric acid.

From 100 parts of linseed-cake there were obtained 2·25 of nitrogen.

The above results may be usefully tabulated as follows :—

Substance Analysed.	Ashes per cent.	Phosphoric Acid per cent.	Nitrogen per cent.
Capsules, ...	8·80	0·39	1·80
Husks, ...	6·54	0·38	1·50
Seeds, ...	5·18	0·47	1·81
Cake, ...	8·67	0·81	2·25

To establish a comparison of the nutritive values of these bodies, it is first necessary to remark, that, according to the analyses of

Boussingault, whose correctness is worthy of great confidence, the nitrogen and phosphoric acid of wheat and oats, which we may take as standards, are as follow:—

In 100 parts, wheat contains 2·3 of nitrogen, and 1·13 of phosphoric acid, per cent.

Oats contain 2·2 of nitrogen, and 0·60 of phosphoric acid, per cent.

Now, representing the real nutritive powers of these varieties of food as being the result of the nitrogen and phosphoric acid conjoined—that is, of their product—and assuming the nutritive power of wheat as a standard—100— we find that we may express the

Nutritive	power of	Wheat, ...	100
,,	,,	Oats, ...	51
,,	,,	Flax, capsules with seeds, ...	27
,,	,,	Husks, ...	22
,,	,,	Flax-seed, ...	33
,,	..	Linseed-cake, ...	70
,,	,,	Dry clover hay, ...	39

The precise nutritive value of the different substances yielded by the flax plant is thus seen; and it becomes evident that the capsules, or husks, may be used as food with very great advantage, although they are not equal to the other richer materials with which I have compared them.

It will be easily understood that the quantities of each kind of food, necessary to support the life of an animal, will be inversely proportional to the numbers assigned above, as expressing their nutritive powers.

(Signed,) Robert Kane.

In reference to the value of the capsules, chaff, or bolls of the flax plant, in the Third Annual Report of the Royal Society for the Promotion of the Growth of Flax in Ireland, Mr. Niven, of Chrome Hill, states that he had a cow which only gave two to three quarts of milk, but having fed her for some time on flax-bolls, she gave *nine* quarts of excellent milk. He, for the purpose of testing the real cause of the very marked improvement which had taken place, discontinued feeding upon bolls, and the consequence was that the quantity of milk given by her fell off so much that she only gave four quarts.

Composition of the Ash of Flax Shoves

The shoves, or refuse woody matters, which are separated in scutching flax, are at present employed in the steeping works as fuel. Dr. Hodges, in the course of the extended investigation of the flax plant, in which he is at present engaged, found that the ash which remains on the incineration of these matters, had the following composition, and might, therefore, advantageously be economised for use as manure. 100 parts of ash afford

Potash, ...	7·73
Soda, ...	5·91
Chloride of sodium, ...	1·78
Lime, ...	20·15
Magnesia, ...	5·46
Oxide of iron, ...	5·60
Sulphuric acid, ...	6·50
Phosphoric acid, ...	10·43
Carbonic acid, ...	20·10
Silica, ...	16·00
	99·66

1,000 lbs. of shoves yield, on combustion, 19½ lbs. of ash

APPENDIX B.

Directions for the proper management of the Flax Crop, compiled by the Committee of the Royal Society for the promotion and improvement of the growth of Flax in Ireland.

The following directions have been carefully arranged from the mass of information obtained by the Society and their agriculturists, during their twelve years' experience in the improved system of management :—

Soil and Rotation.

By attention and careful cultivation, good flax may be grown on various soils ; but some are much better adapted for it than others. The best is a sound, dry, deep loam, with a clay subsoil. It is very desirable that the land should be properly drained and subsoiled ; as, when it is saturated with either underground or surface water, good flax cannot be expected. Without method, there cannot be success ; different soils require a difference of rotation. In the best soils of Flanders flax is grown in the third year of a seven-course rotation, or the fifth year of a ten course rotation. It is not to be considered generally advisable to grow flax more frequently than once in ten years; not because it exhausts the land more than any other crops, but because good *flax* cannot be had at short intervals on the same soil.* In Belgium, it invariably follows a corn crop—generally oats; and in this country, where oats is such a usual crop, the same system might be profitably pursued: but it must be understood, that it is only after oats following a green crop or old lea, and never after two or three succeeding crops of oats, which bad practice still prevails in some districts. It is a very general error among farmers, to consider it necessary that flax should follow a potato crop. Except on very poor soils, a better crop will be produced after grain, and the double profit of the grain and flax secured. If old lea be broken up, and potatoes planted, followed by a grain crop, a very fine crop of flax may be obtained in the ensuing year.

Preparation of the Soil.

One of the points of the greatest importance, in the culture of flax, is by thorough draining, and by careful and repeated cleansing of the land from weeds, to place it in the finest, deepest, and cleanest state. This will make room for the roots to penetrate, which they will often do to a depth equal to one-half the length of the stem above ground.

After wheat, one ploughing may be sufficient on light friable loam, but two are better; and, on stiff soils, three are advisable—one immediately after harvest, across the ridges, and two in Spring, so as to be ready for sowing in the first or second week of April. Much will, of course, depend on the nature of the soil, and the knowledge and experience of the farmer. The land should be so drained and subsoiled that it can be sown in flats, which will give more even and much better crops. Subsoiling should not be done at a less interval than two years prior to the flax crop. This gives the land time to consolidate. But, until the system of thorough-draining be general, it will be necessary, after oats, to plough early in Autumn, to the depth of six or eight inches. *Throw the land into ridges, that it may receive the frost and air; and make surface drains to carry off the rains of Winter. Plough again in Spring, three or four inches deep, so as to preserve the Winter surface for the roots of the flax. The Spring ploughing should be* given some time before sowing, to allow any seeds of weeds in the lands to vegetate, and the harrowing in of the flaxseed will kill them, and save a great deal of after weeding. Following the last harrowing, it is necessary to roll, to give an even surface and consolidate the land, breaking this up again with a short-toothed or seed-harrow, before sowing, which should be up and down, not across the ridges or anglewise.

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* The following rotation, which would bring flax once in ten years, has been proposed:—First year, potatoes; second, barley, laid down with grasses; third year, cut for soiling; fourth year, pasture; fifth year, flax, or the one-half might be better in flax, the other in oats, so that, with the return of the rotation, which would be in five years, the flax could be put on the ground, which, in the last rotatory course, was under corn, throwing a range of ten years between the flax crops coming into the same ground.

A gentleman of much practical knowledge recommends the following as being the most profitable:—1. Oats after the grass and clover. 2. Flax pulled in August; then ploughed and harrowed in with two cwt. guano and two cwt. gypsum; then sown with rape. 3. Potatoes or turnips, well manured. 4. Wheat, sown in Spring, with clover and ryegrass. 5. Hay and clover. 6. Grazing. 7. Oats. 8. Flax and Winter vetches; guano, as before mentioned. 9. Turnips, well manured. 10. Barley, sown with rye-grass and clover. 11. Clover and hay, 12. Grazing. 13. Oats.

Sowing.

The seed best adapted for the generality of soils is Riga, although Dutch has been used, in many districts of country, for a series of years with perfect success. American seed does not generally suit well, as it is apt to produce a coarse, branchy stem. If used, it should be on deep, loamy, soils. In buying seed, select it plump, shining, and heavy, and of the best brands, from a respectable merchant. Sift it clear of all the seeds of weeds, which will save a great deal of after trouble, when the crop is growing. This may be done by fanners, and through a wire sieve, twelve bars to the inch. Home-saved seeds has produced such excellent crops, of late, that it is strongly recommended that every farmer should only sow each year as much foreign seed as would produce a sufficient quantity for his flax crop of the following season.* The thinner portion of the crop would be the best for this purpose, as when flax grows thin, it produces much seed. This plan, besides the saving effected in the price of foreign sowing seed, would effectually secure the farmer from any danger of loss from fraudulently made up seed. It will be best, in most cases, to use the seed which is saved from this in the following year, for feeding, or to sell it for the oil mills, although it often produces good crops. The proportion of seed may be stated at three and a-half imperial bushels to the Irish or Plantation acre; and so on, in proportion to the Scotch or Cunningham, and the English or statute acre. It is better to sow too thick than too thin; as, with thick sowing, the stem grows tall and straight, with only one or two seed capsules at the top; and the fibre is found greatly superior, in fineness and length to that produced from thin-sown flax, which grows coarse, and branches out, producing much seed, but a very inferior quality of fibre. The ground being pulverized and well cleaned, roll and sow. *If it has been laid off without ridges, it should be marked off in divisions, eight to ten feet broad, in order to give an equable supply of seed. After sowing, cover it with a seed harrow, going twice over it*—once up and down, and once across or anglewise; as this makes it more equally spread, and avoids the small drills made by the teeth of the harrow. Finish with the roller, which will leave the seed covered about an inch—the proper depth. The ridges should be very little raised in the centre, when the ground is ready for the seed, otherwise the crop will not ripen evenly; and, when land is properly drained, there should be no ridges. The sowing of clover and grass seeds along with the flax, is not advised, when it can be conveniently avoided, as these plants always injure the root ends of the flax. But carrots may be sown in suitable soils, in drills, so that the person pulling the flax may step over the rows, which may be afterwards hoed and cleaned, and should have some liquid manure. A stolen crop of rape, or winter vetches, or of turnips of the stone or Norfolk globe varieties, may be taken after the flax is pulled. Rolling the ground after sowing is very advisable, care being taken not to roll when the ground is so wet that the earth adheres to the roller.

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* The produce of seed averages about 12 bushels the statute acre, so that the seed saved off one statute acre would sow about five.

Manure for the Flax Crop.

Recent chemical investigations have shewn that the fibre of flax does abstract from the soil certain matters, although not in so large a proportion as several other commonly cultivated crops. To supply to the soil all the matters which the entire plant requires, so as to leave the land in the same state of fertility as before, the following compound has been proposed, by Professor Hodges, as a manure, which may be sown broadcast on the land, prior to the last harrowing before sowing the flax-seed:—

For a Statute Acre of Land.

		s.	d.
Muriate of Potash, 30 lbs., ...	cost about	3	0
Chloride of Sodium (Common Salt), 28 lbs., ..	"	0	3
Burned Gypsum, powdered, 24 lbs., ..	"	0	6
Bone dust, 54 lbs., ...	"	3	3
Sulphate of Magnesia (Epsom Salts), 56 lbs.,	"	4	0
		11	0

Weeding.

If care has been paid to cleaning the seed and the soil, few weeds will appear ; but if there be any, they must be carefully pulled. It is done in Belgium by women and children, who, with coarse cloths round their knees, creep along on all-fours. This injures the young plant less than walking over it (which, if done, should be by persons whose shoes are not filled with nails). They should work, also facing the wind, so that the plants laid flat by the pressure may be blown up again, or thus be assisted to regain their upright position. The tender plant, pressed one way, soon recovers ; but, if twisted or flattened by careless weeders, it seldom rises again.

Pulling.

The time when flax should be pulled is a point of much nicety to determine. The fibre is in the best state befor the seed is quite ripe. If pulled too soon, although the fibre is fine, the great waste in scutching and hackling renders it unprofitable ; and if pulled too late, the additional weight does not compensate for the coarseness of the fibre. It may be stated, that the best time for pulling is, when the seeds are beginning to change from a green to a pale brown colour, and the stalk to become yellow for about two-thirds of its height from the ground. When any of the crop is lying, and suffering from wet, it should be pulled as soon as possible, and kept by itself. So long as the ground is undrained, and imperfectly levelled before sowing, the flax will be found of different lengths. In such cases, pull each length separately, and steep in separate pools, or keep it separate in the same pool. Where there is much second growth, the flax should be caught by the puller just underneath the bolls, which will leave the short stalks behind. If the latter be few, it is best not to pull them at all, as the loss from mixture and discoloration by weeds would counterbalance the profit. If the ground has been thorough-drained, and laid out evenly, the flax will be all of the same length. It is most essential to take time and care to keep the flax even, like a brush, at the root ends. This increases the value to the spinner, and, of course, to the grower, who will be amply repaid, by an additional price, for his extra trouble. Let the handfuls of pulled flax be laid across each other diagonally, to be ready for the

Rippling.

Which should be carried on at the same time, and in the same field, *with the pulling. If the only advantage to be derived from rippling was the comparative ease with which rippled flax is handled, the practice ought always to be adopted*; but, besides this, the seed is a most valuable part of the crop, being worth, if sold for the oil mill, £3 per acre, and if used for feeding stock of all kinds, at least £4 per acre. The apparatus is very simple. The ripple consists of a row of iron teeth screwed into a block of wood. This can be procured in Belfast, or may be made by any handy blacksmith.* It is to be taken to the field, where the flax is being pulled, and screwed down to the centre of a nine-feet plank, resting on two stools. The ripplers may either stand or sit astride at opposite ends. They should be at such a distance from the comb, as to permit of their striking it properly and alternately. A winnowing sheet must be placed under them, to receive the bolls as they are rippled off; and then they are ready to receive the flax just pulled, the handsfull being placed diagonally, and bound up in a sheaf. The sheaf is laid down at the right hand of the rippler, and untied. He takes a handful with one hand, about six inches from the root, and a little nearer the top with the other. He spreads the top of the handful like a fan, draws the one-half of it through the comb, and the other half past the side; and by a half-turn of the wrist, the same operation is repeated with the rest of the bunch. Some, however, prefer rippling without turning the hand, giving the flax one or two pulls through, according to the quantity of bolls. The flax can often be rippled, without being passed more than one through the comb. He then lays the handsfull down at his left side, *each handful* crossing the other, when the sheaf shall be carefully tied up and removed. The object of crossing the handsfull so carefully, after rippling, when tying up the beets for the steep, is, that they will part freely from each other, when they are taken to spread out on the grass, and not interlock, and be put out of their even order, as would otherwise be the case. If the weather be dry, the bolls should be kept in the field, spread on winnow-cloths, or other contrivance for drying; and, if turned from time to time, they will win. Passing the bolls first through a coarse riddle, and afterwards through fanners, to remove straws and leaves, will facilitate the drying. If the weather be moist, they should be taken in-doors, and spread out thinly and evenly on a barn floor, or on a loft, leaving windows and doors open, to allow a thorough current of air, and turned twice a-day. *When nearly dry, they may be taken to a corn kiln (taking care not to raise it above summer heat), and carefully turned until no moisture remains. By the above plan of slow drying, the seed has time to imbibe all the juices that remain in the husk, and to become perfectly ripe. If it be taken at once from the field, and dried **hurriedly** on the kiln, these juices will be burned up, and the seed will become* shrivelled and parched, little nutritious matter remaining. In fine seasons, the bolls should always be dried in the open air, the seed thrashed out, and the heaviest and plumpest used for sowing or crushing. The light seeds and chaff form most wholesome and nutritious feeding for cattle. Flax ought not to be allowed to stand in the field, if possible even the second day; it should be rippled as soon as pulled, and carried to the water as soon as possible, that it may not harden.

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* The best ripples are made of half-inch square rods of iron, placed with the angles of iron next the ripplers, 3-16ths of an inch asunder at the bottom, half-an-inch at the top, and 18 inches long, to allow a sufficient spring, and save much breaking of flax. The points should begin to taper 3 inches from the top.

Watering.

This process requires the greatest care and attention. River water is the best. If spring water has to be used, let the pond be filled some weeks, or months, if possible, before the flax is put in, that the sun and air may soften the water. That containing iron or other mineral substances should never be used. If river water can be had, it need not be let into the pond sooner than the day before the flax is to be steeped. The best size of a steep-pool is 12 to 18 feet broad, and 3¼ to 4 feet deep. Place the flax loosely in the pool, in one layer, somewhat sloped, and in regular rows, with the root end underneath; the tie of each row of sheaves to reach the roots of the previous one; cover with moss sods, or tough old lea sods, cut thin, laid perfectly close, the sheer of each fitted to the other. Before putting on the sods, a layer of rushes or ragweeds is recommended to be placed on the flax, especially in new ponds. As sods are not always at hand, a light covering of straw may do, with stones laid on it, so as to keep the flax just under the water; and as the fermentation proceeds, additional weight should be laid on—to be removed as soon as the fermentation ceases, so as not to sink the flax too much in the pool. Thus covered, it never sinks to the bottom, nor is affected by air or light. A small stream of water, allowed to run through a pool has been found to improve its colour. In this case, if the pools are in a line, the stream should be conducted along the one side, and run into each pool separately, and the water of each pool run off, along the opposite side, in a similar manner. It will be sufficiently steeped, in an average time, from eight to fourteen days, according to the heat of the weather, and the nature of the water. Every grower should learn to know when the flax has had enough of the water, as a few hours too much may injure it. It is, however, much more frequently *under*-watered than *over*-watered. The best test is the following:—Try some stalks, of average thickness, by breaking the *shove*, or woody part, in two places, about six or eight inches apart, at the middle of the stalk; catch the broken bit of wood, and if it *will pull freely out, downwards, for that length, without breaking or tearing the fibre, and with none of the fibre adhering to it,* it is ready to take out. Make this trial every six hours, after fermentation subsides, for sometimes the change is rapid. Never lift the flax roughly from the pool, with forks or grapes, but have it carefully handed out of the flax drain by men standing in the water. It is advantageous to let the flax drain twelve to twenty-four hours, after being taken from the pool, by placing the bundles on their root ends, close together, or on the flat, with the slope; but the heaps should not be too large, otherwise the flax will be injured by heating.

There are two new systems of steeping or retting flax, on a large scale, now in operation. The one is by hot water, or what is called Schenck's method; and the other by steam, or Watt's method. In both cases they are carried on, on a large scale, by persons who purchase the flax straw from the farmers, as pulled and dried on the Courtrai system. Both plans are protected by patents, and authorisation to adopt them must be had of the patentees.*

Spreading.

Select, when possible, clean, short, thick pasture ground for this operation; and mow down and remove any weeds that rise above the surface of the sward. Lay the flax evenly on the grass, and spread thin and very equally. If the directions under the head of rippling have been attended to, the handsfull will come readily asunder, without entangling. Turn it two or three times while on the grass (with a rod about eight feet in length, and an inch and a-half in diameter), that it may not become of different shades, by the unequal action of the sun, which is often the case, through inattention to this point. Turn it when there is a prospect of rain, that the flax may be beaten down a little, and thus prevented from being blown away.

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* By addressing a communication to Messrs. Bernard & Koch, Cregagh Flax Works, Belfast, terms for Schenck's system may be ascertained, with full particulars of the apparatus required.

Lifting.

Six to eight days, if the weather be showery, or ten to twelve if it be dry, should be sufficient on the grass. A good test of its being ready to lift, is to rub a few stalks from the top to the bottom; and, when the wood breaks easily, and separates from the fibre, leaving it sound, it has had enough of the grass. Also, when a large proportion of the stalks are perceived to form a *bow and string*, from the fibre contracting and separating from the woody stalk. But, the most certain way is, to prove a small quantity with the handbreak, or in a flax mill. In lifting, keep the lengths straight and the ends even, otherwise great loss will occur in the rolling and scutching, Let it be set up to dry for a few hours, and afterwards tie it up in small bundles; and, if not taken soon to be scutched, it will be much improved by being put up in small stacks, loosely built, with stones or brambles in the bottom, to keep it dry, and allow free circulation of air. Stacks built on pillars would be the best.

Drying

By fire is *always most pernicious.* If properly steeped and grassed, no such drying is necessary; but, to make it ready for breaking and scutching, exposure to the sun is sufficient. In some districts, it is put to dry *on kilns*, in a damp state, and is absolutely burned before it is dry, and the rich oily appearance of the flax is always greatly impaired. On this point, the Society can scarcely speak too strongly, as the flax is either destroyed, or rendered not worth one-half of what it would be if properly dried.

Breaking and Scutching,

If done by hand, should be on the Belgian system, which is less wasteful than that practised in Ireland. If by milling, the farmer will do well to select those mills in which the improved machinery has been introduced. The Society would also recommend that the farmer should endeavour to have his flax scutched by a mill-owner who pays his men by the day, and not by the stone, even if it should cost him higher in proportion; the system of paying the scutchers by the stone rendering them more anxious to do a large quantity in the day than to produce a good yield from the straw.

The Courtrai System.

This is the mode in which flax should be saved for steeping on Schenck's or Watt's patent systems. It requires to be very carefully done, as inattention will reduce the value of the straw, and yield inferior fibre. When made up, for drying, in large sheaves, the straw is much injured, the outside stalks being much discoloured by the heat of the sun, before the inside of the sheaf is dry. The flax stems should be put together in bunches, about one-half larger than a man can grasp in one hand, spread a little, and laid on the ground in rows after each puller; the bunches laid with tops and roots alternately, which prevents the seed-bolls from sticking to each other in lifting. It should be stooked as soon after pulling as possible, and never allowed to remain over night unstooked, except in settled weather. The stooking should go on at the same time as the pulling, as, if flax is allowed to get rain while on the ground, its colour is injured. A well-trained stooker will put up the produce of a statute acre, or more, in good order, in a day, with two boys or girls to hand him the bunches. The flax should be handed with the tops to the stooker. The handsfull, as pulled, are, set up, resting against each other—the root ends spread well out, and the tops joining like the letter A. The stooks are made eight to ten feet long, and a short strap keeps the ends firm. The stooks should be very narrow on the top, and thinly put up, so that they may get the full benefit of the weather. In six or eight days, at most, after being pulled, the flax should be ready for tying up in sheaves of the size of corn sheaves. It is then ricked, and allowed to stand in the field until the seed is dry enough for stacking. To build the rick, lay two poles parallel on the ground, about a foot asunder, with a strong upright pole at each end. The flax is then built, the length of a sheaf in thickness or breadth. The bottom poles should be laid North and South, so that the sun shall get at both sides of the rick during the day. In building, the sheaves should be laid tops and roots alternately, built seven to eight feet high, and finished on the top by laying a single row of sheaves lengthwise, or across the others, and then another row as before, but with the tops all the same way, which gives a slope to throw off rain, and finished by putting on the top a little straw, tied with a rope. In this way, if properly built, it will stand secure for months. It can be stacked at leisure, or put in a barn, the seed taken off during the winter, and the flax steeped in the following May; or it may be kept stacked, without receiving any injury for two or three years, or even longer.

APPENDIX C.

British Association's Meeting at Belfast. Dr. Hodges' Lecture on the Flax Plant.

THE following extracts embody the most novel points brought forward by Professor Hodges, in his paper read before the British Association, at Belfast, 23rd September, 1852:

The composition of the Flax Plant.

I conceive that the most satisfactory method will be to communicate the history of a crop grown by myself for experimental purposes, and the progress of which I was able carefully to watch, from the sowing of the seed to its conversion into dressed flax for the market. Some of the details which I have collected, though of much importance in the study of agricultural science, have not been hitherto much attended to in this country. The field selected for the experiments was situated about a mile and a-half from Belfast. It has a S.W. aspect, and the soil is composed of transported materials, such as are common in the districts surrounding Belfast.

July 28.—One plant of flax, in seed, was taken—height above ground 31 inches, root, 5½ in. long; length from surface of field to first branch, 24 inches. About 5 inches of the lower end of stem had become yellow. The weight of entire plant was 71.1 grains. It was cut into three portions, which were separately incinerated, with the following results:—

1. Root and lower part of stem weighed, dried, 6.60 grains, gave 0.094 ash, 1.424 per cent.

2. Capsules and branches, dry, weighed 9.47, gave .293 ash, 3.094 per cent.

3. Middle portion, dry, weighed 5.55 gave .143 ash. Ash in dry stem, 2.622 per cent.

August 10*th*.—One plant taken—entire length with root, 37 inches; length from surface of soil to branches, 29 inches; stem of a light straw colour; leaves withered on 10 inches of stem; capsules 10 in number—seeds green; weight of entire plant, 71 grains; branches and capsules, 31.8 grains; water in plant, 45.335 grains; solid matter in do., 25.665 grains; inorganic matter in do., 1.006 grains.

Per centage Composition.

Water, ...	63.852	dry.
Organic matters, ...	34.732	96.08
Ash, ...	1.416	3.92
Total, ...	100.000	100.000

August 25.—The pulling of the crop was begun—a plant was taken and examined; weight of entire plant, 62.40 grains; weight of capsules 22.50.

Per centage Composition of Stem.

	In Fresh Plant	*Dry*
Water,	56.64	..
Organic matters,	41.97	96.89
Ash,	1.39	3.11
Total,	100.00	100.00

Water in straw of plants as sent to the steeping works, after 14 days' exposure to the air, in stooks, 12.2 per cent; water in air-dried capsules, 11.84 per cent; weight of the air-dried flax, with bolls produced on the experimental field, 7,770 lbs.

Composition of the Crop.

100 parts of the ash of the dry straw and capsules had respectively the following composition:—

	Ash of Straw.	*Of Capsules.*
Potash,	20.32	16.38
Soda,	2.07	6.25
Chloride of sodium,	9.27	12.98
Lime,	19.88	13.95
Magnesia,	4.05	3.91
Oxide of iron,	2.83	0.38
Sulphuric acid,	7.13	14.51
Phosphoric acid,	10.24	23.26
Carbonic acid,	10.72	6.37
Silica,	12.80	0.67
Total,	99.31	99.66

Amount of Nitrogen contained in the Straw and Capsules.

The proportions of nitrogen contained in the straw and capsules were ascertained by the method of Well and Vanentrap, calculated from the bi-chloride of ammonia and platinum. The results were as follow, per cent.:—

1. In the straw dried at 212°, ... 0.53 nitrogen.
2. In the capsules or bolls do., ... 1.26 do.,

One of the earliest among those who directed their attention to the chemical composition of flax, was a distinguished member of this Association, Sir Robert Kane. Since that time analysis of the ash of straw of flax have been published by Professor Johnston, of Durham; Messrs. Mayer, and Brazier, and by Mr. Way, in England; by Lench Tweiss, in Germany; and by the Reporter. The only examination of the proximate constituents of the plant, so far as I am aware, consists of an analysis of the seed by Leo Mayer. It is indeed strange that a plant, the straw of which has afforded occupation to the industry of so large a portion of the world in all ages, and the preparation of which, for commercial purposes, consists in acting upon its proximate constituents, should not have been more carefully investigated. Having been for some time engaged with investigations for the Royal Flax Society in this important department, I shall, on some other occasion, bring before you the details of my analysis. At present I shall merely state the general results of the examination of a specimen of flax straw taken from the experimental crop. A preliminary examination of the straw having indicated the presence of a volatile oil, a quantity of the stems of the plant carefully deprived of the seed capsules was distilled with water containing common salt, and from the distillate, which was without action on litmus, I obtained an oil of a yellow colour; 5lbs. of the stems afforded about ten grains of this oil, which had an agreeable penetrating odour, and the distillate of the stems suggested the peculiar smell which is remarked on entering a room where flax is stored. The straw, coarsely powdered, was placed in an extraction apparatus, and successively treated with ether, absolute alcohol, water, dilute hydro-chloric acid, and weak solution of potash. The solutions obtained on examination were found to contain wax, traces of chlorophyle, a peculiar green resin, a bright brown gum resin, which presented some of the characters of the principle which Pagenstecher termed linen, and described as existing in the *Linum catharticum*, or " purging flax," but could not be identified with it, a modification of tannic acid, which afforded a grey precipitate with perchloride of iron, but was not affected by solutions of isinglass or tartar emetic gum, not affected by solution of borax or basic sillicate of potash, a brown colouring matter, albumen, casein, starch, pectin, cellulose, and salts. The following table exhibits the action of the various solutions employed:—

1. Soluble in ether,	2.83
2. Soluble in absolute alcohol,	3.52
3. Soluble in water,	5.92
4. In dilute hydro-chloric acid,	22.76
5. In dilute caustic potash,	16.39
6. Cellulose and salts,	48.58
	100.00

I shall now proceed to the fourth division of the subject, and describe the various methods which are adopted for the purpose of preparing the flax plant for the spinner. I shall not, in this place, allude to the economy of its seed, but confine myself to the management of the fibre of the plant, to obtain which, of superior quality, is the main object of the flax-growers of Ulster. When a portion of the straw, as it is termed, of the flax plant is examined, it is found to consist of three parts; first, of a woody central hollow column, which the microscope shews to be composed of cellular tissue; second, of a tubular sheath, composed of long and firm bast cells; and thirdly, of a delicate covering of epidermis. By rubbing a piece of dried flax straw between the fingers, the woody central part and delicate epidermis can be readily broken to pieces, while the tough fibres of the bast cell will be found to remain but little injured. Those tough fibres, which are capable of being split into filaments of extreme delicacy, constitute the raw material of our greatest national manufacture.

From the earliest times only one method has been found capable of yielding the textile material in a condition adapted for every purpose, and possessing all the qualities demanded by the spinner, viz., the decomposition by the process of fermentation of the adhesive substances which connect together the bast fibres and the ligneous tissues of the straw. It is by this process, variously modified in the arrangements for conducting it, that nearly all the fibre produced in the great flax-growing countries of Europe is at present prepared. In many parts of Germany the fermentation is induced by exposing the flax, spread in the fields, to the influence of the air and moisture; while in Belgium, which is justly regarded as the model country of flax management, the practice of enclosing the straw in wooden frames, and immersing it in the waters of rivers until the necessary changes are produced, is, in many places, adopted and found to yield fibre of superior quality.

In Ireland, at the present time, two modifications of the system of fermentation are in use—one of which consists in steeping the straw in pools of water in the open air at ordinary temperatures, while according to the other method, the steeping is transferred from the farm to the factory, and the fermentation accelerated by employing water maintained at an elevated temperature. The former method of steeping has prevailed in this country and in other parts of Europe to some extent from the earliest times; and though it has been asserted by some writers, without, however, any authority for the statement, that the ancient inhabitants of this island prepared the flax in the same rude manner, by beating the unsteeped straw, as observed among some of the people of the South Sea Islands, yet we may, I think, infer from the number of places to which the name "*poll-a-lin*," *i. e.* flax-hole, is applied, that they steeped it in water. The plan followed by the farmer, who adopts the plan of steeping the flax on his farm in the open air, is to excavate a pond in connexion with some convenient stream. The dimensions preferred are from twelve to eighteen feet broad, and about four feet deep. The quality of the water employed requires careful consideration —hard waters being found materially to interfere with the process; ferruginous waters also are avoided; and in those districts where the steeper is obliged to make use of them, the flax acquires a dark tinge, which the bleacher finds it difficult to remove. From the action of the salts of iron upon the modification of tannic acid, which I have shewn to exist in the straw, we can readily understand that the presence of iron in the water of the steep-hole, must be prejudicial. As the oozing of water from the adjoining soil also frequently produces discoloration of the flax, careful steepers place on each side of the pond a small drain to prevent the entrance of drainage waters. The flax after pulling, is prepared for steeping by removing the seed capsules, or bolls, by means of a simple machine, composed of a number of iron teeth, about eighteen inches long, screwed to a socket of wood, and fixed perpendicularly on a long bench, upon which the workmen sit. The bolls are separated from the stems by the workmen taking a handful of the flax, spreading it out, and drawing it through the teeth of the ripple, as the machine is termed. Sometimes, however, the steeping does not take place until the flax has been stored for some time, and has become so dry that the fibre would be liable to injury by using the common rippling machine. In such cases the seed is beaten off by means of a beater, formed of a block of wood furnished with a curved handle.

During the steeping, the water acquires a dark brown colour, carbonic acid is disengaged in great abundance, and the surface becomes covered with a gelatinous scum. To remove this matter, it is usual to allow a gentle current of water to flow over the surface of the pond from the supplying stream, as, when it is allowed to remain, the colour of the flax is found to be injured.—Various methods are resorted to in this, and other flax-growing countries, to ascertain the proper period for the removal of the flax from the pond. Thus, the Silesian steepers take some stalks of the flax from the pits, and place them on the surface of the water. If the stalks sink, they remove the flax, but if they swim they allow the steeping to continue for some days longer; while the

Irish farmer, day after day, when the fermentation has fairly commenced, anxiously tests the progress of decomposition, by drawing a few stalks from one of the flax bundles, and breaking them across in two places, about three inches apart. If he can readily pull away the central woody column, without tearing the filaments of bast which surround it, he considers that the period has arrived for removing it from the pit.

It is easy to perceive that the peculiar series of changes which facilitate the breaking up of the various organic compounds which compose the structure of the flax plant, must, in our fickle climate, where so many sudden alternations of temperature occur, be liable to frequent disturbance, and that the progress of the fermentation, in the shallow steeping-pools, must be exceedingly irregular and uncertain. It is not, indeed, to be wondered that, notwithstanding the closest supervision, the most experienced steepers should frequently be deceived, and that one part of the flax should be too much decomposed, while another part has not properly experienced the alterations which facilitate the complete separation of the valuable material.

Produce of Fibre, &c.

The amount of rippled flax straw, viz., 5,824 lbs., ascertained in my experiment, considerably exceeded the ordinary produce of the farmer. From the returns of the Royal Flax Society, and from my own inquiries, I would estimate the average produce of a statute acre in the North of Ireland of air-dried flax straw, with bolls, at two tons, which, by the seeding machine, are usually reduced to 3,360 lbs. By the various processes of the rural manufacturer, the amount of dressed flax or fibre obtained averages from four to five cwt. per acre. Some time ago, I made an experiment at one of the country scutch-mills near Belfast, for the purpose of ascertaining the relative proportions of the various products, and also the distribution of the inorganic matters. The flax employed had been steeped in the usual way, and was found to contain 173 per cent. of inorganic matters :—

4,000lbs. of air-dried straw produced of,

Dressed flax,	500 lbs.
Fine tow,	132
Coarse tow,	192
	824 lbs.

The material used contained

In the flax, ... 4.48 lbs. of inorganic matters.
In the fine tow,.. .. .. .. 2.08
In the coarse tow, ... 2.56, or in all 9.12 lbs.

So that 59.08 lbs. of the inorganic matters, which the crop had withdrawn from the field, remained locked up in the woody shoves, which, as obstinately resisting decomposition, are used for fuel, while 9.12 lbs. were carried away in the dressed flax and tow sold to the spinner.

When the crop had been completely air-dried, by exposure in the field, so as to yield as already stated, in the straw, when dried at 212 degs., only twelve per cent. of water, it was removed to the steeping works at Cregagh. It was there placed in stacks, and after some time prepared for steeping. The first operation for this purpose is the removal of the valuable bolls or capsules. This, in these establishments, where the cost of labour is carefully considered, is usually most expeditiously and perfectly effected, by means of a machine composed of two cast iron rollers, to which motion is communicated by a belt from the steam-engine. Between these the flax is passed and the capsules bruised, so that the seed can be readily shaken out. Having been deprived of its bolls, by this machine, it was found that the 7,770 lbs. of flax were reduced to 52 cwt., or 5,824 lbs.

Of the portions of the plant removed by the seeding machine, 910 lbs. consisted of clean seed, 1036 lbs. of husks, leaves, and sand. The loss experienced by the flax in steeping was 13 cwt. From the 52 cwt. of seeded straw, the produce of the experimental crop, there remained 6 cwt. 1 qr. 2 lbs. of marketable fibre.

The taste of the steep-water, at first, is rather agreeably acid, but followed by the peculiar plant-like taste of the flax. By the addition to the liquid of carbonate of lime, its acidity is destroyed. Contrary to what has been stated in some reports on this subject, the liquid, I found, at the conclusion of the process, yields merely a trace of acetic acid, and, in numerous experiments, no trace of the evolution of sulphuretted hydrogen could be detected at any stage of the fermentation. When the flax is allowed to remain in the vats after the usual time, a new series of changes, and a fresh and rapid extrication of gas, take place. I have made, during the last three years, numerous experiments, with respect to the composition of the steep-water from several establishments, and, also, from the common steep-pools, which afforded me some interesting results, and satisfied me that the fermentation which is induced by steeping flax in water resembles the so-called butyric acid fermentation, merely traces of acetic acid, and invariably large quantities of byturic acid having been detected in every case. In fact, the fragrant butyric ether, so extensively comployed in the preparation of pine-apple rum, and in flavouring confectionery, might readily be obtained, in large quantities, from the stinking waters of the flax pool.

To ascertain exactly the effect produced by steeping, and the composition of the steep-water, I obtained from the works at Cregagh, a sample of flax straw unsteeped, a portion, of steeped straw taken from the same lot, and a gallon of the steep-water taken from the vat immediately after the removal of the flax. The composition of the ash obtained by burning the extract of the steep-water, and the samples of the straw, is given in the table. The spring water employed at the works, is moderately hard, indicating, on Dr. Clarke's scale, 8 degrees. It was not considered necessary to deduct the ingredients supplied in it, as these would add but little to its fertiliizng value. An imperial gallon of the liquid of the vat was found to contain in grains and tenths :—

Organic matters, ...	136.7
Inorganic matters, ...	131.4
Total solid matters, ..	268.1 grains.

Composition of the Ash of the Flax Straw before and after Steeping, and of the inorganic matters of the Steep Water.

100 parts of each respectively contained,

	Unsteeped Flax.	Steeped Flax.	Ash of the Steep Water
Potash, ...	13.88	11.40	19.31
Soda, ...	5.33	4.17	.....
Chloride of Potassium, . .	.....	....	3.83
Chloride of Sodium, ...	6.47	3.28	21.24
Lime, ...	18.86	17.69	8.23
Magnesia,..	4.10	5.50	10.18
Oxide of Iron, ...	5.40	5.76	2.02
Sulphuric Acid, ...	11.16	4.07	6.10
Phosphoric Acid, ...	9.63	11.87	3.77
Carbonic Acid, ...	10.37	20.006	23.30
Silica, ...	15.23	15.78	1.12
Sand, ...	....	....	0.60
	100.43	99.58	99.77

Ash per cent in the Straw, .. .	*3.59*	*2.59*

100 grains of the dried extract of the steep water contained 1.56 nitrogen, = 1.89 *grains of ammonia; therefore, an imperial gallon* would be capable of supplying 5 grains, and a vat, containing 3,000 gallons of water, 21-10lbs., worth about 1*s.* 2*d.* to the farmer: while the same amount of liquid placed on his field would convey to them about the same amount of phosphoric acid.

By the kindness of the proprietors of the steeping works at Cregagh, who have liberally given me an opportunity of inspecting the books of their establishment, I am enabled to give the following statement of the changes which 100 tons of flax undergo when treated by Schenck's process.

100 tons of air-dried Flax Straw yield:—

	Tons.
1. *By Seeding*—33 tons of seed and husks, leaving of seeded flax,..	67
2. *By Steeping*—67 tons of seeded flax yield of steeped straw, ..	39.5
3. *By Scutching*—39½ tons of steeped straw yield of dressed flax, ..	5.90
„ of tow and pluckings, ...	1.47

APPENDIX D.

MacBride's Patent Self-Acting Scutching Machine, MacAdam Brothers and Co., Belfast, Makers. The makers having perfected the details of the Machine, can recommend it with confidence.

For a long time past the want has been felt, in all flax-growing districts, of a machine capable of scutching the Flax straw without the assistance of skilled hands. Not only is the expense of employing trained workmen for this purpose a serious item in the preparation of Flax, but latterly even these have become scarce, owing to great demand, and to other causes. Besides, the rapid extension of the new systems of steeping Flax on a large scale in Factories or Retteries, renders more important than ever the introduction of a self-acting machine, capable of doing a large quantity of work, independent of workmen. Various attempts have been made, from time to time, to produce such a machine, but until now, none have been found to answer.

MacAdam Brothers & Co., Belfast, have the gratification of announcing that they are at length able to supply a scutching machine which accomplishes all the objects required.

1. It is perfectly *self-acting*, merely requiring the Flax straw to be put in at one side, and the finished Flax taken out at the other. From the moment the Flax enters the machine no further attention is necessary; the machine does all, and delivers it out perfectly scutched.

2. *No skilled workmen* are required; the only attendance necessary being one person to put in the Flax, another to take it out, and some children to hand the Flax to and from these persons All clasps or holders for fastening the Flax are dispensed with, so that the work is of the simplest possible kind.

3. The *cost* of scutching is thus diminished largely, the attendants being all of the class of ordinary labourers.

4. The Machine will do a large quantity of work in the day—namely from 50 to 60 stone (of 16 lbs. each) of scutched Flax in twelve hours, according to the quality of the Flax;—that is about two and a half tons of straw.

5. *It is adapted for* ***all kinds*** *of Flax straw,* whether cold or hot steeped, hard or soft; and a simple provision is made by which the action of the machine can be altered to suit the different qualities.

6. It scutches the Flax with perfect *safety* to the fibre, leaving the "reed" whole from end to end.

7. For this last reason it is evident that the "*yield*" of fibre, from a given quantity of Flax straw, must be greater than in any of the ordinary modes of scutching; and such is found to be the fact. Hardly any "tow" is produced by the Machine.

8. The *power* required for driving the Machine is four-horse, or about *half* the power required for an ordinary scutching-mill capable of doing the same quantity of work.

This Machine has been the result of years of patient experiments on the part of the inventor; and, although quite novel as far as regards many of the arrangements, is founded on the well-tried principle of the Irish scutching-handle, but applied in a new form. To many persons this would at once be a sufficient recommendation.

Further information may be obtained, on application, from the makers.

MACADAM BROTHERS & CO., *Sôho Foundry, Belfast.*

APPENDIX E.

Roan Spinning Mills, Dungannon, 24th, Nov. 1853.

DEAR SIR,—In compliance with your letter of the 19th instant, I went to see Mr. MacBride's scutching machine at work in the Messrs. McClelland's scutch mills, Dungannon, and to say the least of it, I was more than astonished with its performance. In my opinion, it is the only machine you might call a perfectly self-acting machine. When I was present, there was 28 pounds of flax straw put into the machine, which produced 5 pounds of well scutched flax.

(Signed) JOHN STEVENSON.

APPENDIX F.

The following pages are explanatory of Schenck's Patent System, and will afford ample and practical information on the subject:—

Site of a Rettery.

In the selection of a site for a rettery, the following requisites, which are all of importance, must be kept in view. They are—An open space of four to eight statute acres, according to the proposed size of the establishment, accessible by good roads, and unsheltered by either hills or plantations, to ensure quick drying. A constant supply of pure, soft water, for retting, having, if possible, a fall of six feet, by which pumping is avoided.

A good outlet for the waste water.

The vicinity of a village, or of cottages, from which a sufficient number of hands can be obtained.

If the machinery is to be driven by water-power, it is absolutely necessary that the supply of water be never-failing. Great inconvenience and serious loss would be caused by a partial stoppage of the work, during the best season; it would then be found necessary to erect a steam-engine, which would cause an additional outlay.

Buildings of a Rettery.

The manner of laying out the buildings of a rettery must vary according to local circumstances, but there are some general principles which must, in all cases, be kept in view. Economy of labour is aimed at in all manufacturing establishments, and in a rettery this point is of paramount importance. Flax is very bulky, and has to undergo so many manipulations, in its dry and wet state, that the arrangements must be such as to save all unnecessary handling, carrying, and labour of any kind. For this purpose, the different operations must be carried on in distinct places, contiguous to each other, and, in order to avoid any confusion, they should follow each other in an onward direction. Ample space must be given in each department, want of room being of great disadvantage.

The annexed plan of a model rettery conveys an idea of such arrangements, combining the principal requisites for commodity and cheapness of labour. It will be seen that the flax moves on regularly in the same direction, from the seeding room, to the retting room, thence to the spreading-room, the drying sheds, &c.

The plan shews the buildings to consist of
The seeding room with loft above.
The vat-house and spreading-room.
The drying sheds.
The desiccating house.
The store-sheds.
The scutching mill, and engine or water-wheel house.

The seeding room must be of large size, so as to allow ample room for the manipulation, and to contain a stock of flax. For the greater facility of bringing the flax in, it should be on the ground floor, be lofty enough, and have doors sufficiently large to admit loaded carts or trucks. It should be so situated that a shaft can be brought in, and driven from the main power, and so that it be in communication with the vat house. The loft is used for cleaning amd storing the seed, and for various other purposes, it should have a good, strong floor.

The vat house and spreading room consists of a ground floor only. They can be built together with a valley roof, resting on pillars. The portion of roof over the vats should have louvers to give ventilation, and to allow the free escape of the vapours which arise from the vats. Asphalte makes a good floor for the spreading room. All the doors should be at least six feet wide. Hooped, wooden vats, oval shape, have been found to answer best; they resist the pressure caused during the fermentation, and are not liable to frequent leakage; they are also handy to work, and can be easily repaired. Wooden, square vats, however strongly made, do not keep stanch for a long time.

The drying sheds are to be erected on an open space, well exposed to the winds, and not far distant from the spreading room. They must be placed at right angles with the prevailing wind, and at fifty or sixty feet distance from each other.

The desiccating house is divided into two separate rooms, each to contain the flax of one day's work. A fire-proof construction is to be preferred.

The store-sheds are necessary for housing the dried flax previous to its being scutched. They should be erected near the scutching mill, and made so as to allow carts to go under.

The scutching mill must be immediately adjoining to the power, whether steam or water; it must be dry, and well lighted, and built of sufficient dimensions to contain, besides the machinery, a stock of flax straw, and to give plenty of room to the workers.

The stack yard should be situated as near as possible to the main works, and facing the seeding house.

Work performed in a Rettery.

Seeding.—This is done by a machine made expressly for the purpose, and acting by means of rollers, between which the seed end of the flax is passed sideways, two or three times, the capsules or bolls are crushed, and the seed falls out uninjured, the flax straw being neither crushed nor put out of shape. After the beets have passed through the machine, they are lashed, to shake out the loose seed and the broken bolls. As the flax requires to be in a dry state for that operation, a stock equal to several days' work should always be kept in the seeding house. This stock to be renewed whenever the state of the weather permits.

The seed and bolls are then passed through a dressing machine fitted with the proper sieves. Seed intended for sowing should receive a double cleaning, to remove all light pickle. The clean seed should be kept on a well ventilated loft, and be allowed to remain some time exposed to the air, receiving occasional turnings before it is put into bags —barrels are better.

The bolls or chaff are excellent food for cattle, when steamed and mixed with turnips.

Several other methods of seeding have been resorted to, but they are all open to objections. Thrashing machines cause a great waste, and damage the ends of the flax, and part of the seed is left in the centre of the beet. Rippling requires a large space, and numerous hands—is too slow and expensive; besides, in this case, as with the thrashing machine, the bolls have to be crushed afterwards. Beating the seed off by hand is less objectionable, but it is only applicable on a smaller scale.

Sorting.—This work must be done very carefully, and requires experienced hands. The sorters have to separate the different qualities, according to colour and length, forming new beets containing but one quality. They pass these new beets to the binders, who tie them singly, as handed to them, keeping the roots square;—rush bands are preferable. It is a good plan to cut off the roots by a machine like a chaff-cutter, as it facilitates the after-handling; the beets are now selected and piled up according to quality. The object of sorting is, to have every vat filled with the same description of flax, which ensures a more uniform retting and more even quality. The flax is now ready to go into the vats.

Retting.—In order to have in every vat as nearly as possible the same relative proportions of flax and water, it is well to weigh the flax before putting it into the vat; the beets must be placed carefully upright, the roots resting on the false bottom, and pressed slightly together by the workman as he goes on filling, care being taken that all be straight to facilitate a free upwards circulation of the heated water and of the gases. When the vat is filled with flax, the covers are put on and secured by cross-bars, so as to keep the flax 4 or 5 inches immersed in the water. The vats are then filled up with cold water, and enough steam is turned on to raise the heat to 90 deg. in about eight hours; the temperature of the water is not to exceed at any time 90 deg., but must be kept uniformly at that degree, day and night, during the whole retting process; this is easily effected by letting in steam whenever the temperature begins to fall. The flax must not be left any length of time in the cold water, as it would retard the fermentation; therefore, the vats must not be filled with cold water long before the time the steam is to be put on.

The number of hours for the retting are to be reckoned from the time the steam is turned on at first. The duration f the process averages about sixty-six hours, but will vary according to circumstances such as the following:—

The quality of the water.—That which is soft and more suitable for fermenting purposes will produce a more active and quicker retting.

The description of flax.—Good, sound, well matured and well saved flax requires more retting than unripe, green-pulled, or otherwise damaged flax.

Quality aimed at.—If the object is to bring the fibre to great fineness, the retting must be carried on longer than for obtaining a stronger but coarser article.

In some cases a temperature of 80 and 85 deg. may be advantageously used, but the retting will then require a longer time than with the water at 90 deg.

One of the best tests for ascertaining when flax is properly retted, is to take a few stalks of average fineness, which are broken in two places about three inches apart; if the wood so broken, separates easily on being drawn downwards, without tearing the fibre or retaining any part of it, the flax is sufficiently retted, and the water may be run off.

It may answer in some cases to give two successive rettings to the same flax; strong hearty flax will be improved by this double operation, but, of course, it increases the expense. After the first retting, flax must be thoroughly dried, before it is put again in the water for the second operation.

Drying.—It is important that flax should be dried as quickly as possible, to prevent any further decomposition. For this purpose, it is spread between the holders, which are suspended under the drying sheds. These holders consist of a double wooden rod, fastened together by a wire staple and peg in the centre, and by metal rings at each end. The under rod is placed on a table, flax is spread evenly over it, and the upper rod is put on and fastened, as mentioned above. It takes fifty holders for each cwt. of flax, weighed when dry.

The flax has to remain three days under the drying sheds;—in favourable weather it will be quite fit for being tied and stacked; but if the atmosphere is damp, the drying must be completed by means of artificial heat, which should not exceed 90 to 100 degrees. This last process must be watched very carefully; for, if the flax be overdried, its quality may be considerably impaired. Flax must in no case be scutched immediately after drying; it should first be put into stacks, or under open sheds, where it has to rest. Six weeks is considered to be a sufficient time to bring it to its scutching point.

Scutching.—Flax can be scutched either by hand or by machinery. Hand-scutching, although productive of good results, when performed by a skilful workman, is not practicable on a large scale, owing to the difficulty of procuring the number of trained hands necessary for the work. Machinery must, necessarily, be resorted to. With that at present in use, the operation of scutching requires, on the part of the workman, practice and experience,—in fact, it is a profession of itself; a description would be quite inadequate to convey a correct idea of it, and would, in no case, enable a person to do the work who had not learned it practically. Machines have been brought out lately, *calculated to dispense with skilled labour, and there is every probability that they will be brought to work satisfactorily.*

The shoves, or woody part, produced at the scutching mill, are used as fuel, three tons of which are equal to one ton of coals in raising steam.

Classing.—On leaving the scutch mill, flax has, finally, to be classed according to its quality and value, and to be made up into bundles, after which it is ready for market. Each rettery should adopt a regular classification for the different qualities, each being always represented by the same mark and denomination. This will facilitate the sale.

APPENDIX G.

New Machine for Cleaning the Tow-waste of Scutching Mills.

(Invented by Messrs. Calvert and Garnett, Cleckheaton, Yorkshire.)

In all scutching mills, a large quantity of waste is produced, consisting of portions of tow mixed with the *shoves* or woody dust detached from the fibre of the flax. A part of this, imperfectly cleaned, is usually separated, and sold under the name of "scutching tow," for coarse purposes, but the remainder has hitherto been totally worthless for any manufacturing uses, and is employed as *fuel*, although containing much fibre, as no means existed of cleansing it from the dirt. A very ingenious and effective machine has just been introduced by Messrs. M'Adam Brothers & Co., Soho Foundry, Belfast, which converts this hitherto valueless material into good saleable tow, worth from £10 per ton upwards. The machine requires about a horse power, and may be driven by a band from the shaft of a scutch-mill. The waste is spread loosely on a moving feeding-sheet, and is drawn in by rollers and thrown out at the opposite end of the machine, well opened and cleansed, presenting a very different appearance from that of the tangled and matted mass which entered the machine. No skill is required in the attendant, so that a woman or a boy is quite sufficient, and the machine will produce about 10 cwt. of cleaned tow in the day. It is not easy to form a correct estimate of the quantity of this material which is annually burnt or thrown away in Ulster, but as there are upwards of 900 scutching mills at work, the amount thus lost must be very large indeed. At the annual meeting of the Flax Society, samples of the uncleaned waste, and of the same, after passing through the machine, were exhibited in the Society's rooms, and excited great attention. The machine was also exhibited at work in the Soho Foundry.

APPENDIX H.

Mr. Schenck's method consists essentially in the employment of hot water. It is strongly recommended by the Royal Belfast Flax Society, and has been long enough in operation to warrant the publication of the opinion which is now almost universally entertained of its merits. The following is a description of an establishment for the prosecution of Mr. Schenck's process, situated on the Newport river, county Mayo. It is taken from a report on the subject by Mr. M'Adam, the Secretary of the Belfast Society. He says, "The tenements, containing the vats and drying shelves, are simple wooden sheds, of cheap construction. In one end of the building are four vats, set parallel to each other, the length of the house. They are made of inch deal, in the form of a parallelogram, fifty feet long, six broad, and four deep. There are false bottoms perforated with holes. Underneath these are introduced the steam pipes, crossing the vats, and having stopcocks at their entrance, by which the steam can be let on from the main pipe, as required. The steam is generated in a small boiler, which also serves to turn two hydro-extractors—a patent apparatus used to drive off a portion of the water with which the flax is saturated, on being taken from the vats. The flax is packed into the empty vats, on the butt ends, in a half-sloping position, precisely as in the case of a steep pool, only one layer being the depth. The water is then let in, and a frame fastened over the top of the flax, answering the end of stones and straw, or sods, in the steep pools,—the prevention of the rising of the flax in the course of fermentation.

The steam is then let into the pipes by turning the stopcocks, and the water is some eighteen or twenty hours in becoming heated to the required point, 85° to 90°. The fermentation then commences, and no further steam is required, the action going on until the flax is thoroughly retted, which is in forty hours afterwards, being sixty from the time of the admission of the water. At the end of the sixty hours, the flax is taken out, the water allowed to run off, and the vat permitted to cool. The same process is then repeated, with fresh water and fresh flax. When taken from the water, the flax is packed in the hydro-extractor, which is a round vessel of iron, made to revolve by *steam power with great velocity, the water being driven out of the flax on the principle of centrifugal force. Thirty beets or small handfuls are placed in this machine at a time, and about twenty lbs. of water* are extracted in three to five minutes. A few hours suffice for the contents of a vat, each vat containing two tons of flax straw. The hydro-extractor only separates a portion of the water; the flax now remains to be thoroughly dried. In summer, or indeed for six months in the year, this can be accomplished as usual by spreading on grass land in the open air. During winter, however, it is necessary to find other means of drying. A shed has, therefore, been erected, communicating by doors with the vat house, filled with ranges of shelves, composed simply of railings of lathwood in five or six tiers. The flax is spread lightly along these shelves by women, and the house is heated by steam-pipes. This house is capable of drying the full of one vat per diem. The flax when dried is made up in small beets or handfuls, of a size suited for feeding into the breaking rollers of the mill.

About ten vats per week can be steeped in this establishment, say twenty tons weight of straw, and producing, say two-and-a half to three tons of fibre. Thus, in one year, such an establishment would be capable of turning out 120 to 150 tons of flax for market, being the produce of 400 to 500 statute acres. The fuel used for the boilers is principally 'showes,' with a small quantity of turf. Mr. Bernard estimates the cost of steeping, drying, heating, and scutching the flax at £10 to £11 per ton, which is £3 per statute acre. Subtracting say 10*d.* per stone, or 6*s.* per cwt. for scutching, the cost of steeping and drying would thus appear to be about 24*s*, per acre,—a sum certainly less than the usual estimates of these operations, as commonly performed by farm labour.

APPENDIX I.

Plantain Fibre.

There is ample reason to believe that we may safely congratulate West Indians on the completion of a machine which promises to be of the utmost importance to these Colonies, by which the fibre of the

Plantain is cleaned and prepared in the most simple, cheap, and expeditious manner. Attempts to construct such a machine have for several years occupied the attention of some of the ablest mechanicians of Europe, and have caused a vast expenditure of time, labour, and money without success. Many expensive and ingenious machines have been made and patented; but all have failed when brought into full operation, owing partly to the peculiar nature of the substance to be acted upon, and partly to ignorance respecting its nature and qualities. All the inventors acted on the principle of crushing the stem of the plant, and combing out the substance, filling up the interstices between the fibres, thus freeing them from native impurities. This appears to have been a false principle, and is the chief, if not the only, reason of all the failures that have resulted. But the failure of one party only stimulated others to greater exertion of mind, and greater diligence in developing their plans. The valuable qualities of the Plantain fibre for the manufacture of many descriptions of textile fabrics, for which flax, hemp, and even silk, are now used, as well as cordage and paper, held out the prospect of a rich reward to the successful inventor of a suitable machine for its preparation; and therefore it was that so many engaged in experiments which they deemed likely to realize their hopes of success. But the honour, the gratification, and, we hope we may add, the profit, that have hitherto eluded the grasp of so many ardent and anxious experimenters, seem to have fallen to the Honourable Francis Burke,* the Puisne Justice of Montserrat. This gentleman has been for several years experimenting in various ways on the Plantain stem, and trying to procure the fibre in a suitable state for manufacture; and it gives us great satisfaction to say he appears to have at last succeeded, even beyond his most sanguine hopes.

He has completed a small machine which perfectly cleans the fibre, and leaves a beautiful white silky substance, resembling flax, only that it is about three times the length of flax, capable of being manufactured into any description of textile fabric, from the finest cambric to the coarsest sail-cloth. There are some specimens of the fibre now at this office for the examination of those interested in such matters.

We have not seen the machine; but several gentlemen of this island have witnessed its operations, and they declare that its simplicity of action, the ease with which it can be worked, the impossibility of its going wrong and injuring the fibre, and its extreme cheapness, are surprising. A piece of the stem of the plant is held by one end in the hand, passed into the machine through the "feeder," and, being still held in the hand, is drawn out again perfectly clean and white., It can be worked either by the hand, by a mule, by water, wind, or steam power, according to its size. To work it requires no skill; a little boy or girl to "feed" it, is all that is requisite to ensure its satisfactory operation. The fibre cleaned in the course of the day is ready for shipment the same evening. A small machine to be worked by the hand, which will cost little more than three guineas, irrespective of any patent right, will, with the assistance of a little boy or girl to feed it, clean about 150 lbs. per day, and is so portable, being contained in a box about eighteen inches square, that it can be taken to the spot where the plantains grow; they may be cut down, prepared, and the fibre carried home in the evening, ready for shipment. It can also be made on any scale—large enough to clean a ton a day if requisite. So small is the waste, that from 75 to 80 per cent. weight of prepared fibre is procured from the plant, irrespective of its watery particles. And this waste substance is a valuable pulp, which requires only to be washed to fit it for manufacture into the finest writing-paper. The pulp alone, it is reckoned, will pay the cost of working, and the fibre will be net profit.

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* Now (December, 1854,) arrived in England with his machine, and with a quantity of the Plantain-stems to show its actions upon them.—Eds. *Journal of Botany.*

Mr. Burke, whose indefatigable experiments and researches into the nature of West India fibres, and the best mode of preparing them for the manufacturers' use, seem to be now crowned with success, has determined, so soon as the accident from which he is now suffering (which we mentioned a couple of weeks since) permits, on going to England to procure a patent. He also intends to apply for patents in each of these Colonies. We learn that the machine will be exhibited, and its operation shown, at the Industrial Exhibition in this island (Antigua) next month.

We omitted to state that the Dagger (the Aloe), and all the fibrous tribes of the West Indies, are as readily and as perfectly acted upon as the Plantain.

APPENDIX J.

Price's Patent Candle Company, Belmont, Vauxhall, London.

SIR WILLIAM HOOKER, *Royal Gardens, Kew.*

MY DEAR SIR,—Acting upon your suggestion, and hoping to induce your correspondents to examine any wax berries, oil nuts, or oil seeds, they may come across during their travels, and to assist them in ascertaining the commercial value, I have noted down a few hints, which I have now the pleasure of sending you.

Every oil, or grease, whether solid or liquid, if not poisonous or acrid, like croton oil, or viscid and gummy, like castor oil, or drying, like linseed oil, must be worth in London at least £30 a ton. Among greases solid, at above 60° Fahrenheit, the higher the melting point (other things equal), the greater the value; for example, the vegetable tallow of Borneo melting at about 90° Fahrenheit, is worth at least £5 a ton more than the cocoa-nut oil of Ceylon melting at 70°. The effect of the soap duty having been taken off, may probably, before long, materially change the relative values of greases; but, at present, liquid oils, like the ground nut *(Arachis hypogea)*, are worth more than soft solid oils, like the Bassia butter of India, as they require less manufacturing to fit them for use, the liquid oils after a simple treatment in a cheap apparatus, being fit for burning in lamps, while the soft solid oils, being neither hard enough for use in candles, or liquid enough for use in lamps, require to go through a press before they are saleable, except for soap making. Greases may have particular advantages, such as being little acted upon by the air, and therefore not easily becoming rancid, good qualities, which can only be ascertained by experiments; which your correspondents had perhaps better leave to us.

Since I last had the pleasure of writing to you, we have been engaged in some experiments upon oils, for use in medicine, in which it seems probable they will take an important place; already one vegetable oil has been found to be almost as efficacious as cod liver oil, with the advantages of being less unpleasant and cheaper. On account of this new use, it might be well to collect small quantities of oils, even if they did not obey the conditions mentioned above. The value of oil must depend a little (especially when found in out-of-the-way places) upon the way it is held in its matrix; for example, the oil of the Lumbang-nut *(Aleurites triloba)* can be separated with much less labour and simpler machinery than the cocoa-nut oil, which requires very great pressure to extract it from the copperah, or dried cocoa-nut kernel.

Waxes are worth more than greases, on account of their very high melting points; their relative values depend upon colour, transparency, and freedom from resinous matter. Resin may be easily detected by lighting a small piece of the wax; the more smoke, the greater proportion of resin, and therefore less value; the paler and more transparent the wax the better. The most valuable tree wax known, is the beautiful insect wax of China.

A simple way to try an oil nut, is to crush it with a stone, and then squeeze it between your finger and thumb; if it contains any considerable quantity of grease, enough will be pressed out to judge of colour, hardness and sweetness; if the nut tastes oily, and yet oil does not come out by this treatment, it is well to dry the kernel before squeezing; and, in the case of nuts containing grease solid at a high temperature, like that of the *Myristica sebifera,* it is well also to heat the nut. Where a stearic candle can be got, and is burned down a little, until it has formed a cup, and then blown out, if into this a little of the material to be tried is placed; after a moment's burning, the candle material with which the wick is saturated is burnt out, the new material to be tried, in the cup takes its place, and becomes the material supplying the wick until the cup is emptied, and so can be judged of, or a piece of string dipped in the oil or melted grease makes a very tolerable wick, or simpler still, where the nut is very full of oil, if lighted at one end, it will at least show what tendency to smoke there is, and the colour of the light.

Some of the resins ought to come in for candle making, though I believe that they have never been extensively used, except for the commonest sorts of candles, on account of their giving off so much smoke; but as some descriptions smoke less than others, there is a hope that new ones may be found smoking still less, these would then be very serviceable in candle making. The points connected with new greases, &c., that we should be most thankful for information upon, are, the manner of growth, probable expense of collecting, means of transport, and quantity likely to be obtained, with small specimens of the grease, if manufactured, and of the fruit, with both its husk and hard shell, where these exist.

I have, &c ,

5th December, 1853. GEORGE F. WILSON.

Communications respecting various Seeds and Plants, useful and ornamental, collected in the Central and Eastern Provinces of China, and forwarded to the Society, by R. FORTUNE, ESQ.

In accordance with instructions received from the Government of Bengal, I have the pleasure to send you a large collection of seeds, &c., which I have collected for the Society during this autumn and winter in the Central and Eastern Provinces of China. The box containing these seeds has been shipped in one of the Peninsular and Oriental Company's steamers, which leaves this Port to-day, and I have the honor to enclose a bill of lading, by which you will observe the freight is made payable in Calcutta.

All the seed papers are marked with names and numbers, and I also enclose a detailed list of the whole in this letter. You will observe I have included five varieties of rice grown in China, and I have given you the names by which they are known, in order that larger supplies may be procured, should you consider all, or any of them, of sufficient value.* I also send two kinds of millet which are extensively grown in the tea districts, and often between the rows of the bushes, in order to afford a slight shade during the hottest weather in summer; specimens of these in ear are also sent for the Society's Museum.

When in the Province of Chekiang last autumn, I procured a specimen of the Hemp Palm *(Chamærops sp.)*, and I now send you a portion of its stem, showing the large quantity of fibre it forms under the leaves. This fibre is of great value to the natives, who use it for a variety of purposes, such as ropes, cables, twine, brushes, hats, cloaks, &c., &c. The detached sheets I send in the box will shew how it is cut from the tree. I trust these articles will be acceptable additions to the Museum of the Society.

Nos. 13, 14 and 15 are seeds of plants cultivated in China for their fibre, and which, if not already in India, are well worth introduction. One of them—the Lūk Mä—seems identical with the Indian "Jute," which is now becoming an article of considerable importance.[*] No. 9 contains seeds of the "Tung-ean," from which a valuable wood oil is expressed, much used by carpenters. No 10 contains seeds of a kind of hawthorn, from which excellent jellies and other preserves are made. Nos. 20, 21, and 22, are used as soap by the natives, and the latter is that described by Dr. Falconer in the seventh volume of the Society's *Journal.*

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* These have been tried at Darjeeling, in the Punjab, and some other parts of India, but found to be of inferior description to the rices cultivated here. —Eds.

In addition to these various productions I must draw attention more particularly to Nos. 18 and 19. These papers contain ripe seeds of the *Green Indigo* (so-called,) which is so much thought of by the French chemists, and to which my attention was directed by Dr. Falconer and Mr. Henley through the Government of India and the Society.[†] I have also succeeded in procuring plants of the cultivated kind, which I shall take an early opportunity of forwarding to the Society. I need not remark upon the importance of taking great care of these seeds, but I may suggest the propriety of sending a portion of them to a cooler climate than that of Bengal, say to the N. W. Provinces or Assam, where they will probably succeed quite as well as they do in China.[‡] As I gain more information concerning this important dye, I shall not fail to communicate it to the Society.

I have only to add, further, that the box contains a good supply of the seeds of various ornamental trees, such as *Cryptomeria japonica,* and the Funereal cypress, which I hope will one day produce useful timber, and give another feature of beauty to the Indian landscape.

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[*] The plants obtained from this seed belong to *Corchorus olitorius*, which yields the jute fibre of commerce.—Eds.

[†] See *Journal* of the Society, Vol. VIII, p. 232.

[‡] These seeds have been distributed to members in Assam, Darjeeling, Chota Nagpore, Baugulpore, various parts of the Punjab, &c. They have germinated most freely in the Society's garden, where a large stock is retained for distribution in due course. The plant belongs either to the *Rosaceæ* or *Rhamnaceæ*, a point which will be determined on flowering.—Eds.

Box* No. 2—*Chinese Seeds for the Agri-Horticultural Society of India.

No. 1. Chinese rice, ("Hong-men-tsing-co")—is sown in the 3rd month, and ripe in the 10th; planted between the rows of the early kind, No. 3, and from 10 to 20 days later.

,, 2. Ditto ditto, ("Peh-men-tsing-co")—sown, cultivated and reaped as No. 1.

,, 3. Ditto ditto, ("Tsa-co") -sown in the 3rd month, and ripe in the 7th—a very early ear.

,, 4. Ditto ditto, ("Tsa-gno-co")—an early ear, like No. 3,—much used in making ardent spirits.

,, 5. Ditto ditto, ("Kwie-hwa-gno-co")—sown in the 4th month, and ripe in the 9th, Chiefly used for distilling purposes.

NOTE.—Nos. 4 and 5 are grown by themselves, that is, other later or earlier kinds are not planted between the rows.

,, 6. Millet, ("So")—sown in the fourth month, and ripe in the 10th.—Hill sides in Chekiang, &c.

,, 7. —— ("Lu") sown in the 3rd month, and ripe in the 6th. Samples of 6 and 7 in this box.

,, 8. *Chamærops sp.*,—Hemp Palm of Central and Eastern China with specimens of fibre and seeds.

,, 9. *Eleococcus oleifera*—A tree from which a valuable wood oil is prepared.

,, 10. *Cratægus Layii*—the fruit of this tree makes a very fine preserve, much esteemed in China.

,, 11. Buck-wheat, (*Polygonum sp.*)

,, 12. Indian Corn.

,, 13. "Lŭk-mā," (Jute?)—Cultivated for its fibre.

,, 14. "Tung-mā," (Malvaceæ)—ditto for ditto.

,, 15. Hwang-mā" (Cannabis?)—ditto for ditto.

,, 16. Ligustrum lucidum—a fine evergreen.

,, 17. Salisburia adiantifolia—one of the largest trees in Central China.

,, 18. "So-lo" (cultivated)—This is the "*Lo-yan*" from which the fine "*green indigo*" is said to be extracted.

,, 19. "So-lo" (Wild.)

,, 20. Round soap.

,, 21. Shanghae soap bean.

,, 22. *Cæsalpinia sp.*—Common soap bean.

,, 23. *Cryptomeria japonica*—Japan cedar.

,, 24. *Cupressus funebris*, Funereal Cypress.

SHANGHAE: *30th Dec.*, 1853.

I have the pleasure to enclose a Bill of lading and list for four cases of plants and seeds collected by me for the Agri-

Horticultural Society of India. These cases were shipped at Shanghae on the 19th of January, and I have now seen them re-shipped at Hongkong for Calcutta. They contain a number of plants, which I believe to be of great value and interest, and I hope they will reach you in good order.

The detailed list which I enclose will give you nearly all the information which is requisite, but I cannot help drawing particular attention to the *Green Indigo* plant (so called) the "Lo-Yan" or "So-lo" of the Chinese, which I have discocovered this year in the Province of Chekiang. In my last dispatch I sent you some seeds of this valuable species, and I have now the pleasure to send six healthy young plants in cases No. 3 and 4. These cases contain also a number of cuttings of another plant, which is extensively cultivated in the same province on account of a blue dye which it furnishes, and which is, in fact, the indigo of that part of China. I have sent a detailed account of the cultivation and manufacture of this important dye to Professor Lindley for publication in the "*Gardener's Chronicle* and *Agricultural Gazette*," and must refer you to that journal for further particulars.*

With regard to the fruit trees in these cases, I may draw attention to the "Yang-mae" *(Myrica sp.)*, which I think will be valuable in India;† to the "Kum-quat" *(Citrus japonica)* well known from the excellent preserve of that name, which is made from it; to the Shanghae and flat peaches, two kinds of great excellence, and to some seeds of the Chinese chesnut, which I have sown in the soil of case No. 3, and which will probably vegetate on the voyage to Calcutta.

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* The information referred to by Mr. Fortune will be found among the "Selections," in the present number. The plant in question has not yet flowered with us, but will probably be found, on further examination, to be *closely allied* to, if not identical with the 'Room" dye plant of Assam, which is a species of *Ruellia*.—Eds.

† Mr. F. refers to this fruit in another paper, where he writes: "The Chinese have a fine variety of this fruit which ought by all means to be introduced to the Himalayas. It is as large as an Orleans plum, and as superior to the Indian one as the apple is to the crab."—Eds.

Amongst other things of interest on account of their useful properties, I may notice the Varnish tree, the Wax insect tree, the Hemp palm, the Soap bean tree, and the *Salisburia*, which forms one of the largest timber trees in the Central and Eastern Provinces of China.

The other plants in the cases are of an ornamental kind. Most of them have been introduced to Europe within the last ten years, and will be found described and figured in the various botanical and horticultural periodicals.

In conclusion, I have the honor to acknowledge the receipt of your letter, dated Nov. 18th, enclosing a translation of a memoir by M. Persoz, and a list of plants you are desirous of receiving from China. I have also to acknowledge the safe receipt of your bill on the Oriental Bank for $200, and shall endeavour to spend that sum in a way that will tend to promote the interests and honour of your Society.

List of plants and seeds in glass cases, marked A. H. S. Nos. 3, 4, 5, 6.

A. H. S. No. 3.

No. 1.	Green dye plant "Lo-yan" or "So-lo" of the Chinese,	3 plants.
2.	Ditto ditto,	3 plants.
3.	*Citrus japonica* ("Kum-quat,")	3 plants.
4.	*Justicia sp ?*—(a plant largely cultivated for the blue dye it produces)—cuttings.	

NOTE.—Chesnuts (Chinese) are sown in the soil of this case; they will germinate on the voyage.

A. H. S. No. 4.

No. 5.	*Cæsalpinia sp.?*—Common soap bean tree,	3 plants.
6.	*Myrica sp.* ("Yang-mae")—a fine fruit tree,	1 plant.
7.	Green dye plant. (same as No. 1,)	3 plants.
8.	Ditto ditto ditto.,	3 plants.
9.	*Dielytra spectabilis*—a beautiful herbaceous plant,	1 plant.
10.	*Justicia sp.* (blue dye same as No. 4.),—a bundle of cuttings.	

NOTE.—Some pods of the soap bean sown in this case.

A. H. S. No. 5.

No. 11.	*Azalea vittata* (a fine new striped species,)	3 plants.
12.	*Chamærops sp.* (the hemp palm—see sp. in the Soc. Museum,)	1 plant.
13.	*Forsythia viridissima,* (a fine spring-flowering shrub.)	1 plant.
14.	*Wiegela rosea,* (a very ornamental bush,)	1 plant.
15.	*Salisburia adiantifolia* (the largest tree near Shanghae,)	1 plant.
16.	*Jasminum nudiflorum* (a fine winter-flowering species,)	1 plant.
17.	*Chamærops sp.*, (hemp palm, same as No. 12,)	1 plant.
18.	*Wiegela rosea* (same as No. 14,)	1 plant.
19.	*Azalea amœna,* (a very pretty new variety,)	1 plant.
20.	*Viburnum dililatum,* (a fine new Gueldres rose,)	1 plant.
21.	*Azalea sp.*	1 plant.
22.	*Chamærops sp.* (hemp palm,)	1 plant.

A. H. S. No. 6.

No. 23.	"Oo-dung" of the Chinese—(an ornamental tree,)	1 plant.
24.	Flat-Peach of China—(a delicious fruit,)	1 plant.
25.	Shanghae Peach, (a very large variety,)	2 plants.
26.	*Fraxinus sp.* (the true wax-insect tree,)	2 plants.
27.	Shanghae Peach (same as No. 25,)	2 plants.
28.	*Rhus sp.* (the true varnish tree,)	several plants.

HONGKONG: 14*th February*, 1854.

On the 14th of February I had the pleasure to send you a bill of lading for four cases of plants and seeds collected by me for the Agri-Horticultural Society of India. To-day I beg to enclose you another bill of lading for a case shipped in the steamer "Shanghae," advertised to sail on the 13th instant.

The list which I enclose will give you information as to the contents of the case, which I hope will reach you in good condition. I beg to draw your attention more particularly to the *rice paper plant** (No. 3), which is a species of great interest.

I had the honor to receive your letter dated February 18th, acknowledging the receipt of the box of seeds (No. 2), and I am glad to hear they reached you in good order.

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* This plant (*Aralia papyrifera*) is doing well in the Society's garden.—EDS.

It will afford me much gratification if you will send me a report upon the state of each consignment, and any hints which you may consider necessary for my guidance shall have my best attention.

In laying this communication before the Society, I beg you will assure the Council and Members of my earnest desire to assist them in conferring great and lasting benefit on the people of India.

List of plants in case marked A. H. S., No. 7., for the Agri-Horti. Society of India.

No 1. Loquat (*Eriobotria japonica*) grafted, (Canton.)
„ 2. Pumelow, (Canton.)
„ 3. Rice paper plant, (Formosa.)
„ 4. Lime, (Canton.)
„ 5. *Azalea Indica*, (Canton.)
„ 6. *Lycopodium, sp.* ("Man-neen-chang" of the Chinese,—Hills of Hongkong.)
„ 7. *Spathaglottis Fortunei*, (8 plants.)

HONGKONG : 14*th March*, 1854.

I have the honor to advise you of having sent to your address (care of the Peninsular and Oriental Company's agent in Shanghae,) a packet of "cabbage oil seed"—*Brassica sp.*,—which is largely cultivated in this part of China, *is very productive*, and the oil which it yields appears excellent in quality. I dare say you cultivate the *Brassica* for its oil in India as well as we do in Europe, but you may not have this particular variety, and I therefore send you its seeds, in order that some of your members resident in oil-producing districts may give it a fair trial. It is what we call a winter-crop in this part of the world—that is, it is ready to be planted in the fields when the rice crop is removed. In other words, it is sown in the end of September and planted out about the end of October. It ripens in May, in time to be replaced by the later varieties of rice.

I believe I had the pleasure of sending the Society a bag of this seed last year, but it probably arrived too late for a fair trial.

Your letter, dated the 20th April, came safely to hand, and gave me much pleasure. The results of my last year's shipments to the Society seem to have been most successful, and I have no doubt you will save a portion of every thing sent round. The loss of a few duplicates does not matter, for such things as you allude to are easily propagated.

TEMPLE OF TIENTUNG: *30th June,* 1854.

I had the honor of writing to you on the 30th of June last, and then advised you of the dispatch of another supply of Chinese cabbage oil seeds, and some samples of cotton cloth dyed with the celebrated "green indigo," of which I sent plants and seeds to the Society last winter.

I have now the pleasure to inform you that I have procured for the Society 35 nice healthy plants of those beautifull varieties of tree-pæony *(Moutan),* formerly discovered by me in this district, and introduced to Europe a few years ago. You will find some of these figured in our botanical periodicals, such as *Paxton's Flower Garden,* to which I refer the Fellows of your Society for an idea of their beauty. The case in which I have planted them is now sent onwards in the P. and O. steam-ship "Lady Mary Wood," as per enclosed bill of lading.

I do not think these pæonys will succeed in the climate of Calcutta, and would recommend them to be sent to some of your members who reside in the northern hilly districts of India, where there is frost in winter.

SHANGHAE: *30th September,* 1854.

In my last letter to you, dated Sept. 30th, I had the pleasure of enclosing a bill of lading for a case of *Moutan* pæonys, which I had procured for the Society. To-day I enclose another list and bill of lading for one box of seeds, and one case of plants, which I have shipped in the "Lady Mary Wood."

In the box you will find a good supply of the seeds of *Cryptomeria japonica*, which I trust will be acceptable to your members who reside in the hilly districts of India. I also send you seeds of the beautiful *Cephalotaxus* discovered by me in China some years since, and now much prized in Europe, where it is perfectly hardy, also a further supply of the Chusan hemp palm seeds. In addition to these, I again send seeds of the two species which yield the "green indigo," in case those formerly sent failed to vegetate.

In the glass case No. 12, I may draw your attention more particularly to the Ningpo lemon, a fruit which is much esteemed by the Chinese on account of its fragrance. In the autumn when this fruit ripens, it is met with in all the houses of the rich. An ornamental plate of old China, on a stand, is filled with the fruit piled one above another, and placed upon a table in the hall or reception room; here it remains for several weeks, and diffuses a delicious perfume throughout the house.

In this case there are also plants of the "wax insect tree,"* the soap bean tree, the hemp palm, and a hardy variety of orange, suitable for a cool hill climate, where the common China orange will not succeed. As ornamental plants, I send you the *Anemone japonica*, *Gardenia Fortunei*, and *Lilium speciosum*, and in the soil of the case I have sown a quantity of the seeds of chesnut and *Salisburia*. The Chinese chesnut is an excellent variety, quite equal, if not superior, to the Spanish. By sowing its seeds in a case in this way, I was fortunate enough to introduce it to the

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* This tree is succeeding so well in the Society's Garden, that a requisition has been made to Mr. Fortune for a supply of insects.—Eds.

Himalayas last year, and I trust the Society will be as successful with those now sent round.*

I shall be glad to have a report upon the state in which these various plants and seeds are received by you, and whether they are acceptable to the members of the Society.

List of plants and seeds in Cases Nos. 11 *and* 12.

A. H. S. No. 11 contains seeds:

Cryptomeria japonica (a box full.)
Cratægus Layii.
Green dye plant (cultivated kind.)
Ditto ditto ditto, (wild kind.)
Cephalotaxus Fortunei (a fine new evergreen.)
Chamærops sp. (Chusan palm.)

A. H. S. No. 12 contains plants:

1. *Anemone japonica* (several plants.)
2. *Fraxinus sp.* (wax insect tree) 3 plants.
3. *Gardenia Fortunei.*
4. Lemon from Ningpo (a very fine variety.)
5. Hemp palm (a pot of seedlings.)
6. *Lilium speciosum* (a very beautiful variety.)
7. Soap bean tree (2 plants.)
8. Orange (a northern variety, suitable for Hills.)
9. Hemp palm (a pot of seedlings.)
10. Lemon (same as No. 4.)

Seeds of chesnuts sown in the soil of this case; do. of *Salisburia*: Ditto ditto, ditto.

SHANGHAE: *3rd December*, 1854.

By this opportunity I have the pleasure to send you a small box (No. 13) filled with seeds, &c. The seeds of the

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* Upon referring to my list, I find that seeds of these chesnuts were also sent to the Society last year. I trust they have succeeded.—R. F. They germinated freely, and there are now upwards of one hundred seedlings on hand. It is also gratifying to record that a great proportion of the seeds received from Mr. Fortune has succeeded well; most of the plants are thriving, more especially the green dye plants, the *Fraxinus sp.* Hemp palm, soapbean tree, *Salisburia*, and fruit trees of sorts.—EDS.

"Amoy pummelow," and "Ningpo lemon" are well worth the attention of the Society. The *Photinia* and juniper are both beautiful trees from the province of Chekiang, and will, no doubt, thrive well in the temperate hilly districts of India. The hemp palm has been sent to you several times before, but you cannot have too much of this useful tree.

Chamærops sp. (hemp palm.)

Juniperus sphærica (a fine new tree from the province of Chekiang.)

Photinia species (a beautiful evergreen from ditto, ditto.)

Amoy pummelow (the finest fruit of the kind in China.)

Ningpo lemon (a very fragrant kind.)

HONGKONG: 19*th March*, 1855.

Communication on samples of various productions from Major S. F. HANNAY's *experimental farm at Deebroghur in Upper Assam.*

To the Secretary to Agri-Horticultural Society,

DATED FORT WILLIAM, 16*th May*, 1854.

Land Revenue.
H. RICKETTS, ESQ.

SIR,—I am directed by the Board of Revenue to forward herewith a box containing samples of various productions of Major S. F. Hannay's experimental farm at Deebroghur in Upper Assam, together with a copy of a letter dated the 17th February last, from Major Hannay to the Collector of the district regarding the samples.

I have, &c.,
A. GROTE,
Officiating Secretary.

CAPTAIN E. T. DALTON,

Collector of Zillah Luckimpore, Deebroghur.

SIR,—I have the honor to acquaint you that, with a view to making known the productive qualities of the soil of this section of the Luckimpore district, I have put up the samples detailed underneath in a small box, and would feel much obliged could you conveniently forward the same to Colonel Jenkins, the Commissioner of the Province, for submission to the Board of Revenue.

1	*Tea*, Pekoe kind unsorted,	1 canister,
2	Tapioca flour,	1 ditto.
3	Rice,	1 bag.
4	Silk common (ungummed), and in the original state,	several small hanks.
5	Cotton (Petti-Gulf)	1 small parcel.
6	Ditto (Sea Island),	1 do. do.

2nd. The articles here enumerated are past year's produce of my experimental garden, a patch of ground lying contiguous to this station, and formerly a waste tract of tree and grass jungle, with the same soil however and undulatory surface which prevails throughout the Muttuck district, and I may say, that including a patch of sugar cane, all have grown up side by side without any particular preparation of the soil, beyond mere surface hoeing aad weeding. The rice being the produce of the low portion of the land subject to inundation in the rainy season.

3rd. The tea is from plants eighteen months old from China stock, having procured the seed from Chabrua, formerly the Government experimental tea garden. There can be no doubt in my opinion from the flourishing appearance of tea plants (China stock) growing in other gardens besides my own, that both soil and climate are suitable to its healthy growth and productiveness. I may observe that Deebroghur is in Latitude 27°32′, and the varieties of temperature throughout the year are much the same as prevails in the black tea country of China, visited by Mr. Fortune. The height of this district above the sea level I am not certain of; it may however be above 500 feet. None of the tea plants in this station are four feet above the high-water mark of the Burrumpooter. The tea sample is manufactured by an Assamese.

4th. The sample of tapioca flour is made from the root of the sweet manihat plant of Assam generally.

5th. The rice is from Johu *dhan* or paddy, peculiar to Assam I believe, and is considered a good table rice.

6th. The samples of silk are from a cocoon common in this district, the worms producing so long as there are leaves to feed them. Of the productiveness of the silk worm I am at present unacquainted; but I found 8½ seers of this cocoon produced one seer of thread. I merely tried this as an experiment, having planted out slips of a foreign description of mulberry in hedges.

7th. The samples of foreign cotton are the produce of plants reared from acclimated seed, and some I got last year from the Agri-Horticultural Society of India, neither of which was very good: I think I may state that the Sea Island is mostly from plants two years old. I offer these samples with diffidence, but from my observations on the growth of these foreign cottons, I think that good acclimated seed of the district will eventually afford good crops. All that appears necessary is that the plants reach such a state of maturity as to be in full flower towards the end of the rains, and this may be managed by sowing the Petti Gulf, of which I have great hopes, in the end of May or June. Both kinds, I think, require shelter from our alternate hot sun and heavy rains. This year I shall try a small quantity of the Sea Island with the Assoo crop of paddy next month, and if this succeed, it can be cultivated very cheaply.

8th. With regard to the sugar cane, samples of which cannot be sent from its bulky nature, it is, I believe, considered of first-rate quality of Otaheitan stock, and this year I am glad to say I have been enabled to supply some thousand of canes and tops to the neighbouring ryots, and hope to see this cane soon take the place of the common worn-out cane of the district.

I have, &c.,

DEEBROGHUR : (Signed) S. F. HANNAY, *Major,*
17th Feb., 1854. *Commg. 1st A. L. I. B.*

Some account of the Chinese Green Indigo Plant, with specimens of the Dye. Communicated by ROBERT FORTUNE, ESQ.

I am particularly gratified to hear you received the green dye plant in safety. I am using every means in my power to gain further information about this interesting production, but you must remember I am in China, where if one is not actually in the district where the substance is produced, to see with his own eyes, he finds the greatest difficulty in obtaining correct information. However, in getting possession of the plant, one step has been gained. In knowing that the dye is produced from the bark is another step in the right direction; and I have now the pleasure to send you two specimens of the cotton cloth which have been dyed with this substance. The small one is part of that taken home to France some years ago, the larger I purchased in a town in the province of Chekiang, about 60 or 70 miles distant from the country where the plant is extensively cultivated, and where the dye is no doubt made. I shall probably be able to send you a sample of the dye itself in a month or two, and I shall at all times be most happy to communicate any information on this or other matters of interest to the members of the Society.

TEMPLE OF TEIN-TUNG : *30th June,* 1854.

In compliance with the wish expressed by the Society I have lost no opportunity of getting information concerning the *green indigo,* (so-called), of which I sent you seeds and plants last year. In a country like China, investigations of this kind are extremely difficult, partly owing to the ignorance and partly to the apathy of the natives. A Chinese, as a general rule, knows little of any art or manufacture in which he is not personally interested, more particularly if it is not carried on in his own district. Hence the strange and contradictory statements which used to be put forth on the difference between green and black tea, one party asserting the impossibility of making the two kinds from one plant, another that green tea was dried in copper pans, and such like nonsense, which has only been dissipated of late years by actual observation in the country itself. With these facts before me, I naturally received with great caution the various statements made to me by Chinese, with reference to the manufacture of this green dye, and as I had no opportunity of witnessing the manufacture myself, I preferred making some experiments in connection with the information I received from the Chinese. As the results of these experiments are sent to the Society in box 13, I shall now proceed to give you the history of them.

I was informed that the seeds of both kinds (wild and cultivated) were used largely in dyeing paper. A specimen of this paper procured in Ning-po is now sent as a sample for the Museum of the Society. Both the species produce seeds in great abundance, I had no difficulty, therefore, in procuring a small quantity of each for my experiments, and I now send you the extract which I prepared from them. The extract from the seeds of the cultivated species which I have evaporated on paper, is yellowish in colour, while that from the wild kind is of a purpleish or violet tint, and apparently very beautiful. These mixed together give a green of various shades, according to the proportion of each kind, and this colour is much varied and improved by the addition of alum, sulphate of iron, and such substances used as mordants by dyers.

The Chinese invariably informed me the seeds were employed to dye paper only, and that cotton and silk fabrics were dyed with the bark. I could obtain no information as to the method of removing the bark from the stems, and from some experiments of my own, I considered the process would be slow and difficult. The Chinese, however, often astonish me by the simplicity of their operations, and I had many reasons to suppose they had some easy mode of getting the bark, which was not apparent at first sight. With a view to get information on this point, I made many enquiries as to the place where the manufacture of this dye is carried on, and at last succeeded in satisfying myself that it was near a city named Kia-hing-foo, situated between Hang-chou-foo and Shanghae. I had visited this city some years since, but had no time to repeat the visit after obtaining the information in question. I therefore communicated it to Dr. Lockhart of Shanghae, who entered warmly into my views, and promised to aid my enquiries in every possible way. On reaching Shanghae in December last, I found that the Rev. Mr. Edkins, of the London Missionary Society, had passed through the Kia-hing district, on his way to Hang-chou-foo, and had succeeded in procuring a bundle of chips in the markets there. The chips are now sent to you, and are no doubt in the form in which the dye is extracted from them by the natives. Thus another step has been gained in this investigation, and indeed there can be little difficulty in finding out, by repeated experiments, the remainder of the process. Dr. Lockhart boiled down a portion of these chips, and obtained the extract which I now send you in a small porcelain box.

I have thus given you all the information I have been able to collect upon this subject, and as I send you the various substances with which I have been experimenting, you will be able to carry the matter further with the aid of chemists and other scientific men in India. If I have not been led into some error, my experiments would seem to prove the truth of what the Chinese have always told me, that the *two species* were necessary to the production of the colour in question. This fact, however, will not affect the intrinsic *value* of the dye itself.

In conclusion, allow me to suggest to the Society that it might be useful to send a portion of these substances to the Academy of Sciences in France, for the inspection of M. Persoz,* and other distinguished French Chemists.

1 Paper of chips, as sold in the markets. } cultivated kind
1 Box of extract from chips. }
1 Extract from seeds of wild kind.
1 Do. from seeds of cultivated kind.
1 Do. from two kinds mixed.
1 Sample of paper dyed by seeds.

HONGKONG: 19*th March*, 1855.

On the Tobacco of Kyoungree, with specimens of the leaf and of the soil in which it is raised. Communicated by Messrs. WILLIS AND EARLE.

Wishing to obtain a small quantity of the best Sandoway tobacco, some seed of the same, and samples of the soil in which it is grown, for analysis, we applied in April last to Captain Cannon, Marine Assistant Commissioner at Akyab, to assist us in procuring them. This gentleman, in reply, very kindly undertook to do so, and told us that he had written to Dr. John Davies, Officiating P. A. Commissioner at Sandoway, requesting him to procure for us, if possible, what we wanted.

On learning this, we immediately wrote to Dr. Davies on the subject, indicating some of the sites, (above the tidal influence,) in which, by former communications made to the Society, it appeared that the best tobacco was grown and cured.

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* These specimens have been transmitted to M. Persoz.

Dr. Davies, in the most kind, prompt, and public-spirited manner, responded to our application, shewing by his communications to us, a most anxious desire, by every means in his power, to extend and improve the useful productions of India.

By the *Fire Queen* we received from Dr. Davies, on the 9th instant, a small quantity of the best kind of tobacco he has been able to procure, grown at " Kyoungree,"—also a box containing three samples of the soil, taken from the surface at six inches depth, and at from six to eighteen inches depth, and a canister of seed sufficient we should think for Bengal.

Of the first, say tobacco leaf, we now send you a sample, and also a box containing three baskets, which we have numbered 1, 2, and 3, of the soil :—

No. 1 ticket—"Surface earth from Kyoungree in Sandoway, 25th May, 1854."

[On this ticket Dr. D. writes, " I shall write more fully regarding these samples of earth that were obtained in my presence from the best tobacco plantation, and packed before me. J. D." But as he was on date of his last communication about to remove to his newly-appointed station, Bassein, and had his hands quite full of business, he has not as yet done so.]

No. 2 ticket—" Earth from Kyoungree found at six inches from the surface. J. D., Sandoway, 25th May, 1854."

No. 3 ticket—" Sample earth from Kyoungree below six, and extending to eighteen inches.

J. Davies, M. D.
O. P. A. C."

And of the seed we shall send you the greatest portion, when we have opened the canister, and taken out a little for some friends.

When writing the 1st April to Captain Cannon, on the subject of tobacco, &c., we were not aware of your having received from Lieut. Ripley so large a quantity of Sandoway tobacco seed as you possess.

Further, as to the soils, it had been forgotten by the writer, that Mr. Piddington, in his very valuable communication on the soils suitable for cotton, tobacco, sugar, and the tea plant, (No. IX of Vol. III., p. 31, &c, of the Society's Transactions 1839), had already analysed the soils of Arracan, Singour, and Hinglee, shewing how superior the first was to the second and third, by containing so much as sixteen per cent of the reddish brown oxide of iron, known as the "peroxide;" it appearing probably, by analyses of the best cheroots,—that to the presence of this peroxide, the fine flavour and colour possibly of the best tobacco, such as Havannah, is attributable. However we do not regret at all having obtained such large samples of the soils so judiciously selected by Dr. Davies, and we hope that the Society may be induced to have each sample subjected to another careful analysis.

The samples having become *very dry*, probably look much less red than they do with the ordinary moisture in them. In No. 3, the peroxide of iron shews itself distinctly in several of the lumps, the ground probably being not usually disturbed below nine to twelve inches.

We beg you will place the muster of Kyoungree tobacco leaf, also the samples of the soils on the table of the Society, and we should be glad if you would cause to be placed on the table also any reports which our gardener, Mr. MacMurray, may have made, shewing his mode of growing, and especially of *curing*, three maunds of tobacco, for which we are pleased to find he has had purchasers at 10 Rupees per maund.

On the subject of this *much-neglected staple* of India, *Tobacco*, the writer hopes ere long to be able to make some further communication to the Society.

CALCUTTA: 16*th June*, 1854.

Extracts from a letter of Dr. J. Davies, Officiating Principal Assistant Commissioner, dated Sandoway, 30th May, 1854, to Messrs. Willis and Earle, Calcutta.

"I have the pleasure to send you per steamer samples of earth for analysis from the best Kyoungree tobacco plantation,—also 10 Rupees' worth of the best leaf tobacco from the same place. The latter was obtained with much difficulty, although at above twice the price it fetches early in the season.

"The seed also I hope you have received; it is usually sown just after the rains, often at a considerable distance from Kyoungree, in *rich clay soil*, and the seedlings of two months are usually planted out, and take four and a half months before the leaves are fit to pluck for drying. During the latter process, as well as while the leaves are fermenting, the Java method is pursued here in long sheds, by the Akyab house that seems most interested in the trade, but the natives only dry their tobacco, &c. This is considered the reason that it spoils so frequently on being kept long, or sent to England.

"*Kyoungree*, means *large river*, from being situated on the latter, and not on a smaller stream that exists to the south of it.

"In going to Kyoungree, I passed Talenzike, a village about two miles to the E. of the station of Sandoway, then came to Thown-She, *i. e.* Long Chui, a mile further, being three from the station, then to Ooyim Geen, about a mile further to the E., where the soil of the low hills appeared well adapted for coffee plantations.

"About one and a half or two miles beyond this, the best tobacco is obtained, the quantity being small, and places best suited for it, limited.

"I here tasted the water of the river, as it moved rapidly over the pebbles, and found it perfectly free from the saline influence of the tide, and the best spots of tobacco land seemed to consist of a loose, rich, surface alluvial deposit, upon stiff clay soil. I am sorry it has not been in my power to visit Proashay, but the tobacco of that place is also considered very superior. The best informed natives say the flavour becomes weaker in proportion as the plants happen to be cultivated near the sea, and those while growing require more frequent watering.

"The paddy most frequently used here is the Yeen-nee, or red sort, and Nakrensie, or white; both are sown in June, sometimes broad cast, but most frequently in nursery beds, and planted out on higher ground.

"Black rice in small quantity is obtainable. It seems well adapted for hospitals, being very mucilaginous."

Remarks on various Specimens of Fibre suitable for Cloth, Cordage, and Paper manufacturing, forwarded by DR. R. RIDDELL, *Superintending Surgeon, Hyderabad Subsidiary Force, and Corresponding Member of the Society: with a Report thereon by* JOSEPH WILLIS, ESQ.

I did myself the pleasure of forwarding to you, a few days ago, specimens of fibre procured from several plants in my garden. Three of them, the plantain, pine-apple, and yucca, were sent more with the view that the others might be compared with them, as to color, strength, &c., than for the specimens themselves, and at the same time to enable the members of the Society, when they meet, to give an opinion how far they think it might be desirable that the plants yielding such fibre should be extensively cultivated.

No. 1. Fibre from the plantain leaf stalk, which, after being stript clean, was gently beaten, and then laid to soak in water for seven or eight days, after which it was taken out, laid on a block, and beaten with a round roller, sprinkling it with water, and ridding it of all its pulp and sap, it was then rinsed in clean water, and hung up to dry. Next day it was dipped in water, and once more beaten. This was my second attempt to clean the leaf, having been able to make nothing of it in the way laid down in the *Indian Journal of Sciences*, published at Madras, in July, 1850. Since then I have tried various plans for cleaning the leaf, and have been able to produce a long fine, clean, light straw-colored fibre, by the following process. I first selected leaves from a plant in blossom, that were as free from being stained and withered as I could find, stript off with a knife all the green leaf from the central stalk, then laid it on its under surface, as when growing, on a flat block of a greater length than the leaf; it was then beaten smooth with a hard round roller, the upper and lower surfaces were then easily divided by the hand being passed between. The upper division was then turned and laid by the side of the lower, the pulp part of both being uppermost, it was then beaten, and the sap and pulp all easily removed, after which rinsed in clean water, and hung up in the shade to dry. The stalk of the plant, which when cut was of a pale white color, I had treated in the same way exactly, and the result was, not as I anticipated, a fine white fibre, but a darkish brown, deeper if any thing, than the sample sent you.

No. 2. Produce from the bark of the *Hibiscus esculentus*, (the Bayndie). This fibre, though coarser than the plantain, is much whiter, and I conceive might be made particularly available for the manufacture of paper, if not for other purposes, and as it is of quick growth, arriving at perfection in from twelve to fourteen weeks in the rains, and about the same time after, three crops could be raised during the year, and it strikes me the plant would grow during the summer months in England, and ripen in the autumn. The natives are fond of the vegetable it bears, and readily cultivate it, and the stem would only be required after the fruit had been removed. The produce of fibre from one plant was an ounce and a quarter, whilst the plantain leaf only gave three quarters of an ounce. The mode of preparing the fibre was pretty similar to the plantain; the stem and branches being cleared of the leaves and shoots with a sharp knife, a slit was made along the stalk, for the purpose of dividing the bark easier; it was then laid on the block and beaten, when the bark immediately separated from the wood part, and was stript off, and the fibre cleaned like the plantain, only it appeared to be much quicker done, and so was the silky fibre from the Mŭddár, (*Asclepias gigantea*), it was beaten out almost at once a pure white.

No. 3. Fibre of *Malope grandiflora*. Procured by the same process after the bark from the stem and shoots had been removed, and the leaf stalks, shoots, and capsules cut off, which has of course rendered the fibre short and uneven, a matter I conceive of no great consequence, if only required to be converted into pulp for paper. The *Malope grandiflora* grows readily in all kinds of soil, but if of a rich loamy nature will in the rains attain the height of ten or eleven feet, with numerous branches, and at the axilla of each leaf, the flower of a purple color makes its appearance, and nearly as large as the straw colored *Hibiscus cancellatus*. Should the plant not be known at Calcutta, I can supply any quantity of seed.

No. 4. From the *Yucca gloriosa*. This plant resembles the aloe in appearance, the leaves shooting from the stem with a hard sharp point. It is very common in all the gardens here, and is easily propagated by shoots or its tubers. The leaves from one plant, which had blossomed and been cut down, yielded two pounds and eight ounces of the fibre. No. 4 is a sample from the fresh leaf beaten out. No. 5 from leaves that had been soaked for ten or twelve days. The difference in color appears to be but trifling, and if it has not impaired its strength, it facilitates the dressing of the leaves in the proportion of three to one.

No. 6. Is some pine-apple hemp, prepared here nearly two years ago. After the fruit had ripened, the leaves were washed, all the edges cut off, and then beaten as the plantain and others described.

No. 7. Is a small sample from a shoot only of the common hedge pink flowered Mallow, found growing by accident near the Bayndie, but which since sent to you, I perceive has been before proposed as one of the materials for the production of paper; nevertheless I shall be glad if, by bringing these plants to the notice of the Society, with the manner of preparing the fibre, it may induce those so disposed to make more successful experiments with the same plants, and extend their researches to others, and thereby assist in developing the resources of the country.

BOLARUM: *23rd September,* 1854.

In a former communication on the subject of "Indian fibres" I mentioned, when I sent you a few samples, that I thought paper might be made from the *Hibiscus esculentus*, known generally amongst the natives as an *Ambaru.* Since then I have found a manufacturer of coarse paper, who resides in the bazar, and have had a trial given to the hemp of the Bayndie, and which I since learn is to be bought in many parts of the Deccan from twelve to fourteen annas the maund of twelve seers, [1*s.* 6*d.* to 1*s.* 9*d.* for 24 lbs]. Here I had to pay one rupee eight annas, [3 shillings]. I inclose you a sample of the paper made from it, and although coarse, I am led to think the fibre if prepared with a little more care, and bleached, would produce paper of the best quality. I have fibre prepared under my own direction nearly white, but which I did not like venturing with the paper manufacturer, until I had seen the result from the bazaar article. The natives grow the Bayndie plant very generally, using the capsule when green as a vegetable, and never pull it up until it has done bearing, when it is pulled, and the leaves if remaining stript off, it is then soaked in water for a time, sufficient to loosen the bark from the reed, beaten out and dried, the root part of the stem being allowed to remain, and this of course increases its weight to the purchaser. When I gave the hemp to be made into paper, I desired the root ends to be cut off, thereby decreasing by so much the quantity of material for the paper, although the man remarked it would make the strongest. My desire was to have as fine a paper as he, with his very limited means, could produce, (merely a wooden beater, a bamboo sieve or frame, and a small chunam lined tank or reservoir). He brought me first a quire as a specimen, and after one ream, size 20 inches by 18, weight 18 pounds, to which if added the previous quire, and the ends of the stalks not used, it shows little loss of material in the making of the paper from twelve seers of the hemp. My object being to ascertain the capability of converting the Bayndie fibre into paper, I allowed the man, as an inducement to do his best, to make his own charge, and his demand was three and a half rupees, [7 shillings]. From the strength and thickness of the paper, there can be no doubt, that with the aid of machinery, and the fibre better prepared, three reams of good paper might be made out of the same quantity.

I shall have the pleasure in a day or two to send you by banghy some sheets of it, also cloth made from the fibre of the *Agave cantula* (the aloe), and specimen of cotton grown here for the purpose of distribution, and if the Society would like to have a few pounds of the seed, it is much at their service.

BOLARUM : 13*th February*, 1855.

Since my last of the 13th inst., I have had the pleasure to send you by banghy a small package containing the following mentioned articles, which oblige me by laying before the members of the Society at their next meeting. The cotton grown here appears of a superior quality, and as I have now raised it successively for three years, it may probably have become acclimated, and should the Society desire some of the seed, I can spare five or six pounds, sufficient to make an ample trial with. The other cotton was also grown here, from seed brought by a friend from Madras, and I believe is originally from the Mauritius. The third specimen is indigenous from Berar, and merely forwarded, though good, for comparison.* A sheet or two of coarse paper made from the Bayndie, *Hibiscus esculentus*.†

Some specimens of cloth from the fibre of the aloe (*Agave cantula*), which may prove a novelty, and be by the Society considered worthy of a place in their Museum.‡

It strikes me if the fibre was spun, it might be turned to many accounts, particularly as a substitute for horse hair, in the manufacture of the part of feminine attire known as crinolines, also for shoes, sieves, similar to the Chinese, bags, for expressing oil from nuts, furniture brushes, being light and strong, and perhaps many other purposes besides cordage, lines for fishing and whip cord. In South America the coarse kind of aloe has always been applied to the making of ropes, but the finer species which grow on the hills, is used for thread and various other purposes, and is called pita, so a friend informs me, and he thinks the fibre of the aloe here resembles the latter.

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* These three specimens of cotton have been reported on by the Society's Committee to the following effect :—

No. 1. Raised probably from New Orleans seed, resembling as it does the cotton of that green seed, or short stapled variety. It is of good color, fine, soft and pliant, but weak in staple. Its value in the Liverpool market about 4*d*. per lb.

No. 2. Raised probably from the Bourbon or black seed variety, fibre long, soft and silky, resembling the Sea Island cotton of the United States, though wanting, perhaps, in the vigor, strength, and complexion of the latter. A very superior cotton, nevertheless, would bring in the Liverpool market, as much as 1*s*. 6*d*. to 1*s*. 9*d*. per lb or even more.

No. 3. Indigenous cotton, grown at Berar, is a good specimen of its kind, and superior to the generality of country cotton, the staple being pretty long and free from that harshness of feel and want of pliancy so common in the cottons of this country, value about 3½*d*. per lb.

† These specimens have been forwarded to the Society of Arts, and to Dr. Royle, for report.

‡ These are deposited in the Society's Museum.

Forwarded by banghy.

Cotton of three descriptions, with two small parcels of seed.

Specimens of paper, two sheets made from the fibre of the Bayndie. Specimens of cloth made from the fibre of the aloe; also aloe and raw silk mixed; ditto, with tussah silk.

BOLARUM: 23*rd February*, 1855.

With much pleasure I acknowledge the receipt of your favor of the 20th, conveying the thanks of the Society for my various contributions, &c., which were submitted to them at your last meeting.

You mistake as regards my having a finer description of paper made from the fibre of the Bayndie. I only said in my letter that I had "fibre from the *Hibiscus esculentus* prepared under my own directions, nearly white, &c." I inclose a small specimen, as it is very different from the Bayndie hemp, as prepared by the natives, particularly in its appearance, besides more is procured from one plant by my process than by the usual method of dressing it. The natives soak their bark for nearly two months, and then beat it out; whereas mine is not soaked for more than from 12 to 15 days. The bark, when fresh pulled off the stem, is cut in lengths of from 6 to 8 inches, and then soaked in a vessel of water, being well stirred and turned about as the pulp around the fibre begins to soften, changing the water two or three times, it is then taken out, and beaten with a round mallet on a block, dashing it with water during this process, after which it is washed and dried.

I found the fresh green bark of 40 stems to weigh twelve pounds, and forty pounds yielded three of fibre, which gives a little more than an ounce to a stem, the latter quantity may be taken as the average. As far as I can judge, the fibre so prepared by the natives is in the proportion of about 6 ounces to ten stems, therefore, if I am correct, my method of preparing the fibre, though a little more tedious, is compensated by the large increase in quantity, and apparently of a better quality for the manufacturing of paper.

I should be obliged if you would send me a small piece of the paper you have made from the plantain fibre. To me it appears that, the process of cleaning the stalk and stem of the leaf is too tedious and expensive to be in any way used for paper in this country, as I have never been able, with the greatest care, to procure from a whole plant seven ounces of fibre, and at the average cost of about Rs. 18 or 19 the cwt.; now the Bayndie fibre can be bought in the Deccan for three rupees the same quantity.

BOLARUM: *31st March*, 1855.

Report on the specimens detailed in Dr. Riddell's letter of the 23rd September, 1854.

No. 1. *Plantain Leaf Fibre.*—This fibre is very coarse, very uneven, very harsh, very weak, and very bad colour. It is of good length, being six or seven feet, but it is of very little value for any purpose, save for common paper making.

No. 2. *Hibiscus esculentus.*—I believe the Bengallee name—*Dharose.* This fibre is coarse, harsh, and rather weak, but of excellent color, and in fair condition; it is of good length, being from four to five feet. I think with the proposer, Mr. Riddell, that it would be found better adapted for the use of the paper-makers than for other more valuable manufactures.

No. 3. *Malope grandiflora.*—I know not this plant or fibre from any previous experience, but I find the *fibre* *to be very coarse, ligneous, very uneven, very harsh, weak, and bad in colour: it is also rather short, being only from three to four feet. Its value, whatever that may be, will, I* think, be best found in the hands of the common paper maker.

Nos. 4 *and* 5. *Yucca gloriosa.*—This fibre is, I presume, from the leaf of the plant commonly known and denominated in Bengal "*Undafule.*" The fibre is about two feet long, and sufficient for machine spinning and manufacturing purposes. It is fine, round, even, and strong, with good colour and lustre. Moderately flexible, having a natural resistent harshness; and if it could be rendered more flexible, it would be very desirable.

No. 5. Having been steeped considerably more than the No 4 in its preparation, is thereby somewhat prejudiced in both its strength and its colour, as hinted at by Mr. Riddell. Perhaps the steeping process may be somewhat diminished and modified, so as to increase the flexibility without abating the strength, lustre, and good condition of the fibre.

I think well of this fibre, and that it is deserving of more extended experiments.

No. 6. *Pine-apple plant fibre of two years previous preparation.*—This fibre is about two feet to two feet six inches long, and is very sufficient for machine work. It is *very* fine, round, even, and also very strong and flexible, likewise with good lustre and condition, after a period of nearly three years since its preparation. I have never seen a production of this fibre before, but I think so highly of it, as to say that it is well deserving of more extended experiment, our soils and climate, generally speaking, being so favourable for the growth of this plant.

No. 7. *Common pink flowering Mallow.*—This fibre is stated to be from a shoot of the common pink flowering mallow. It is about two feet long, but coarse, uneven, harsh, and weak. The colour and lustre very good. It resembles in *general character the fibres of some of the several varieties of the Hibiscus, and, as I think, is better adapted for the uses of the paper-maker, than the machine-spinner and manufacturer.*

I trust it will be perceived that Mr. Riddell is well deserving of the thanks of the Society for the interest he has taken in the subject, and the sensible and intelligible manner in which he has described the process adapted in the preparation of his specimens.

JOSEPH WILLIS.

Some account of the Chinese Potato, DIOSCOREA (JAPONICA) BATATAS.

[The Agricultural and Horticultural Society having applied to Mr. Robert Fortune, now in China, for tubers of the "Chinese Potato," it has been deemed desirable to publish the following interesting particulars regarding it, anticipatory of its receipt, with the view of affording Members desirous of giving it a trial, a fair idea of the character of so valuable a plant, and the mode of culture best adapted for it. It is probable that the plant in question can be easily naturalized in India. The first portion of the following series of papers is translated from *LeBon Jardinier*, for 1854, a very useful little work, edited by M. Vilmorin of Paris; the second is extracted from the *Gardener's Chronicle* for the 22nd July, and 23rd December, 1854, and the 13th January, 1855.—*A. H. B.*]

Since the potato disease has caused so much anxiety about its culture, attention has been more especially directed to different plants with feculent roots, which might, probably, supply its place. The tuberous sorts of *Oxalis*, the Olluco, the tuberous Capucine, the *Psolarea esculenta*, the *Apios tuberosa*, have each been successively studied, and present up to this time but little chance of furnishing a good substitute for the potato; it will, probably, be the same with regard to the *Dioscorea Japonica.* Nevertheless, the introduction into our climate of a plant belonging to a family, which furnishes, in the tropical regions, so considerable a mass of alimentary matter, seems to us to merit some attention, as it would appear, unlike other plants of the same genus, that it can be naturalized, and brought to perfection in our climate.

The *Dioscorea Japonica* was received in 1850, in a collection forwarded to the ministry by M. de Montigny, the French consul in China. In the same year I received it from the Museum; but, guided by analogy, I have cultivated it in a greenhouse as a tropical plant. It was only in 1851 that I saw it would grow very well in the open air. Moreover, the vegetation of the plant being annual, and the roots acquiring in the course of one of our summers, sufficient bulk and maturity to be well preserved, the herbaceous and annual stalks might be destroyed with impunity by the frost, and the plant might be cultivated in the same manner as the potato or dahlia.

When set in the garden, the roots descend in a most remarkable manner. I uprooted one this autumn, which had descended the depth of more than a yard below the surface of the soil. The plant which presented this peculiarity had but one root, which measured in the upper part rather less than half an inch in diameter, but soon expanded in a cylinder, slightly enlarging from the bottom, to a diameter of rather more than an inch, and nearly a yard in length. We may conceive that, at this depth, the roots of the plant are quite sheltered from the frost, and that it might, consequently, be left entirely without fear of being destroyed by the winter,—and the more so as the lower part, swelling again from the root, is that which bears the greatest number of eyes or buds. This peculiarity alone shews that the *Dioscorea Japonica* scarcely answers to what should be sought for in a field plant. Moreover, its skin, although very feculent, is viscous, and more watery than that of the yams of the colonies. On the other hand, this plant being very different in *its mode of growth to any of those we possess (the Tamus excepted) will, probably, be more completely modified by our climate; and if, as was hoped by the flowering which took* place last year at the Museum, that seeds might be obtained *from* it, it is probable, by means of these seeds, varieties may be procured in which the defects we have been describing may be modified or eradicated. L. V. 1852.

1853. We have but little to add to what we said last year about the *Dioscorea Japonica.* Nevertheless, the continuation of our trials has furnished us with some observations which we think useful to record here.

First, as to the eatable qualities of its root; it appears to us that cooking does away with the viscous appearance which renders its aspect so repugnant in a raw state; baked, its skin is very feculent, light enough, and almost entirely deprived of savour, which we consider a recommendation in an alimentary plant. Another rather interesting point is the facility with which the stalks sprout: each knot of these long stalks may furnish a plant, provided they are grown in light and rather damp soil. The herbaceous development of the plant is very weak and tardy, and we are not able to report that it would grow in the open field. The produce raised from each plant, in a rich and deep soil is, on an average, half a kilogramme. If, as might be supposed from the weak development of the stalks, the plant can be cultivated in a small space, one might obtain a certain produce from its culture; but the difficulty of uprooting it, from a soil like that in which we have tried it at Verriére's, would be equal to making a layer of soil of more than a yard in depth, rendering its cultivation impracticable in an economical point of view; unless a species could be discovered, the roots of which would extent horizontally, or some process of cultivation which would destroy their tendency of striking downwards.

Among the valuable drawings of Chinese plants in the library of the Horticultural Society, is one of a dark rugged root, some 10 inches long, and 6 inches wide at the broadest end, of which nothing more is known than that it was obtained from the public vegetable market. There can, however, be no doubt that it represents a yam of some kind.

According to M. Stanislas Julien, as quoted lately by M. Decaisne, a yam, called Chou-Ya, or Tchou-Yu, Tou-Tchou, Chau-Tchou, Chau-Yo, &c., is universally grown in China. That of Nankin is the largest, and of excellent quality; another from the Chou country is still better. Its stems trail on the ground, the leaves are three-lobed; and in the autumn what are called fruits, but no doubt small tubers, appear among the leaves, and eventually drop off. This is perhaps the root represented in the place referred to. There are, however, many other sorts.

But the Chinese yams have attracted no attention in Europe. It is probable that they have been considered too tender, our notions of a yam being formed from East and West Indian reports. It seems, however, that one at least of the Chinese yams is as hardy as a potato, and likely to become a formidable competitor with the potato itself.

M. Decaisne tells us that the French experiments with a yam introduced from Shanghae, and called erroneously *Dioscorea Japonica,* justify the expectation that it will become a plant of real importance in cultivation. "If," says M. Decaisne, "a new plant is to have a chance of becoming useful in rural economy, it must fulfil certain conditions, in the absence of which its cultivation cannot be profitable. In the first place, it must have been domesticated in some measure, and must suit the climate; moreover, it must, in a few months, go through all the stages of development, so as not to interfere with the ordinary and regular course of cropping; and finally, its produce must have a market value in one form or another. If the plant is intended for the food of man, it is also indispensable that it shall not offend the taste or the culinary habits of the persons among whom it is introduced. To this may be added that almost all the old perennial plants of the kitchen-garden have been abandoned in favour of annuals, wherever the latter could be found with similar properties; thus *Lathyrus tuberosus*, *Sedum Telephium*, and *Cirsium oleraceum* have given way before potatoes, spinnage, and the like. Now, the Chinese yam satisfies every one of these conditions. It has been domesticated from time immemorial; it is perfectly hardy in this climate (Paris); its root is bulky, rich in nutritive matter, eatable when raw, easily cooked, either by boiling or roasting, and then having no other taste than that of flour (*fécule*). It is as much a ready-made bread as the potato, and it is better than the Batatas or Sweet Potato. Gardeners should therefore provide themselves with the new arrival, and try experiments with it in the different climates and soils of France. If they bring to their task, which is of great public importance, the requisite amount of perseverance and intelligence, I have a firm belief that the potato yam (*Igname-Batatas*) will, like its predecessor, the potato, make many a fortune, and more especially alleviate the distress of the lower classes of the people."

Testimony of this kind appears too important to be regarded lightly, and we are glad to second the recommendation of so judicious an experimentalist, as M. Decaisne. When we consider how nearly our common black bryony (*Tamus communis*) is related to the yams, the probability of the new plant becoming naturalised among us receives further support. We would also suggest that all owners of ships trading with Shanghae, or other northern Chinese ports, should direct their captains to bring home a quantity of the yams exposed for sale in the markets. We know that there are many varieties, possibly belonging to more species than one, and it is deserving of enquiry whether one may not suit the climate of Europe better than another.

The species described by M. Decaisne is called by him *Dioscorea Batatas*, or Igname-Batate, and is described as having much the appearance of the common Tamus. Its stems are annual, but its roots, or more properly speaking rhizomes, are perennial, and directed downwards perpendicularly, sometimes to the depth of a yard, if the soil is loose enough to admit them. The haulm is about as thick as a goose quill, cylindrical, turning from right to left, and about 2 yards long, violet, with small whitish specks. When left to themselves the stems lie flat on the ground, and strike root very readily. The leaves are opposite, heart-shaped, and triangular, upon purple stalks. The "roots" vary in length and thickness with the soil in which they grow. They may usually be compared to clubs, the blunt end of which is as big as the fist, but which tapers downwards till it is no bigger than the finger. Their skin resembles in colour the well-known beverage coffee and milk, and is covered with numerous fibrous rootlets. Under the skin is a white, opaline, very friable, slightly milky cellular mass, filled with flour, which softens and dries in cooking, till it acquires the taste and quality of a potato, for which it might be mistaken. Each plant may produce several of these roots, though in general there are only two or three.

M. Decaisne and his friends who have tasted this Yam think that no serious objection will be taken to the employment of it as food. The only question is whether a root which buries itself so deep in the ground will suit the habits of cultivators. It is not, however, easy to understand why, in Europe, the trifling mechanical difficulty of getting up such roots should be a hindrance, when the Chinese with their rude tools find the operation easy enongh. In that country the yam is grown on a great scale. M. Montigny, who sent it to France from Shanghae, calls it *Sain-In*, and says it is highly productive, the country people consuming it as largely as the potato in Europe. For propagation the smallest roots are set apart and pitted, to keep them from frost. In the spring the roots are taken out and planted in furrows pretty near each other in well-prepared ground. They soon sprout and form prostrate stems, which are made into cuttings as soon as they are six feet long. As soon as the cuttings are ready, a field is worked into ridges, along each of which is formed a small furrow, in which the pieces of the stem are laid down and covered with a little earth, except the leaves. If the weather is rainy, the cuttings strike immediately; if dry they must be watered till they do strike. In 15 or 20 days the roots begin to form, and at the same time lateral branches appear, which must be carefully removed from time to time, or the roots will not grow to the proper size.

These directions are simple and easy enough to follow; so that we see no reason why, as M. Decaisne remarks, the plant should not be perfectly suited to field cultivation. The crop would hardly be more troublesome than a crop of turnips.—*Gardener's Chronicle, 22nd July,* 1854.

An advertisement having appeared in our columns respecting a new esculent root called *Dioscorea Japonica,* it seems desirable to state what has up to the present time been ascertained respecting the plant. In the *Gardener's Chronicle* for the 22nd of July last, an account was given of a newly introduced hardy Chinese Yam, called *Dioscorea Batatas,* by Prof. Decaisne, which is identical with this *Dioscorea Japonica,* a name that, according to M. Decaisne, belongs to a very different species, and must therefore be abandoned.

Since the appearance of the account alluded to, a couple of plants were received by the Horticultural Society, and placed under the care of Mr. Thompson, who however failed in inducing them to form tubers. Others have been more successful, especially M. Pepin, who in a late communication to the Imperial and Central Agricultural Society of France, gives the following interesting account of his experiments :—

"This plant arrived in a very bad state, nearly all the roots having been destroyed by the fermentation which had taken place in the box during the voyage.

"After the pieces of the roots which were sound had been cleaned and dried for three days, they were planted in well-drained pots, filled with sandy peat, mixed with about one-fifth of rotten dung, so far decomposed as to be reduced to the state of mould. The pots were plunged in a hot-bed, not covered by a frame, in order that vegetation might be accelerated by a gentle and steady bottom-heat; at the same time water was very sparingly given.

"At the end of a fortnight, by the aid of this artificial heat, fibrils and young stems had been developed. The plants were then taken out of the pots and planted in the open ground, in the end of May; a few were planted on an exhausted hot-bed, in order that they might take root more readily, and produce a greater number of roots and stems. These means succeeded perfectly well, and we were enabled to preserve and propagate the plant. The roots taken up in the autumn of 1850 were put into a cellar, where the frost could not reach them; and having kept well through the winter, they were planted out in the spring of 1851, in well pulverised, deep garden soil. The growth of the plants was very vigorous, and the roots attained a large size; one of them, measured in the autumn of 1851, was about 3 feet in length; its form was cylindrical and tapering.

"The stems of this plant wither every year in the end of October. . The first year they were cut off soon after, and the roots taken up, under the impression that they had been injured by frost. The roots were in a growing state when taken up, and this led me to suppose that they might have been left in the ground till the end of November, and that they would have attained a still greater size. I have observed, up to the present time, that the tubers were simple, and had no tendency to ramify; but I have also seen two together, of equal size, that grew from the lower part of the terminal shoot, and had their origin from the same point.

"In August, 1851, before the stems of that year were fully matured, some young shoots were taken for cuttings. They were cut in lengths of between 4 and 5 inches, and horizontally below an eye. They were inserted in pots filled with peat, and placed on bottom-heat in a hot-house, covering them for several days with a bell-glass, so as to completely exclude the air. These cuttings succeeded perfectly well. At the end of a month they had made a sufficient quantity of roots to admit of their being potted singly in 3-inch pots. They were kept in a hot-house, where they continued to grow till December. They had then pushed to the length of from 12 to 14 inches. Up to the present time cuttings made during summer from the herbaceous shoots have only yielded tubers after the lapse of from 14 to 16 months; but those raised from pieces of the roots produced tubers which could be used in the same year.

"It was doubtful whether the roots of this plant would withstand our winters, although some small pieces that were left in the soil when the roots were taken up in 1852 remained alive all winter, and made shoots from 13 to 19 inches in length during the ensuing summer; and the roots of one of these plants were as much as 14 inches deep. The roots which remained in the ground throughout the winter pushed their shoots about the 15th or 20th of April; those roots, on the other hand, which were planted in April did not exhibit shoots till the end of May, or more frequently not till the beginning of June. There is no longer any doubt as to the hardiness of the plants; they have withstood, as I have already stated, the 25° of frost which we have had this winter, and when taken up the skin was smooth and fresh, and the roots altogether were in a sound state, as M. Brongniart, who was present, can testify.

"I preserved a root in a cellar from October, 1852, to the *30th May, 1853, without any appearance of the development* of shoots. It was unchanged, and had not lost weight. I think the tubers may be kept nearly throughout the year, which is not the case with either the common or the sweet potato.

"In *June, 1853,* after having been seven months out of the ground, a root of this plant was analysed, in order to ascertain the amount of nutritive matter which it contained. The following was the result in 100 parts:—

Water, ...	70·40
Starch, ...	18·30
Alkaline phosphates (ashes), ...	0·78
Albuminous matter (a large quantity), saccharine matter (trace), cellulose, mineral substances, &c., ...	10·52
	100·00

"The proportion of starch was determined with the greatest possible care, but the quantity analysed was very small (463 grains); it would therefore be necessary to repeat the analysis with a greater quantity of the root.

"In a few years we shall know to what extent the roots left in the ground will acquire weight and bulk, and how long they may remain in the soil without deterioration of quality. We know, however, that a tuber taken up at the end of three years had its cellular tissue healthy to the centre, where it was also neither hard nor woody.

"From these facts I believe that this plant will be admitted among our cultivated tuberous species, and I am also led to conclude that it will be useful in an agricultural point of view, inasmuch as it remains several years in the ground like the Jerusalem Artichoke, requiring after planting little or no cultivation, and finally that it will furnish, at all seasons of the year, an aliment within the reach of every one."

This report appears to establish the fact that the roots of the Chinese Yam are hardy and productive enough for garden cultivation. Of their quality we can speak from personal knowledge, a portion of a full-grown tuber having been obligingly sent us by Mr. J. Henderson, Kingskerswell, S. Devon, in whose hands, we understand, is the whole saleable stock of the plant. Boiled like a Potato, it proved extremely good, with rather a nutty taste, but it did not become mealy, although the Potatoes which were cooked with it were perfectly so; from which we infer that the roots require to be either steamed or roasted, if to be brought to table in perfection. At all events, it is certain that the Chinese Yam belongs to the first class of garden root crops. Experience only will teach the best way of cooking it, and, we may add, of cultivating it also. Upon the latter important subject we have the following practical directions from Mr. Henderson :—

"The manner in which the Chinese cultivate it is extremely simple. The earth is first formed into ridges, when small tubers or portions of large ones, are planted on the top, at about 3 feet apart; after the plants have attained a little strength, the shoots are spread over the sides of the ridges, and pegged down at the leaf end, 6 or 8 inches from each other (care being taken to cover the joints or parts pegged down with a portion of earth), when they soon strike root, and throw out tubers; by this means, immense quantities of roots, of the size of early-framed kidney potatoes, are raised on a comparatively small piece of ground. The above is the ordinary Chinese mode of culture; but to obtain them of a large size, small tubers, or portions, are planted on ridges, from 10 inches to 1 foot apart, and the plants are allowed to grow freely till late in the autumn, when the foliage is cut away and dried, or partially dried, and given to cattle; the tubers by this means attain on an average 1℔. and upwards in weight. The produce, when the ground is required for other purposes, is taken up and stored away for the winter and spring; and it seems a peculiarity in this root, if exposed to the frost, it is not injured by it, nor does it have any inclination for sprouting till the natural season for planting."

Mr. Henderson further states :—

"That he finds a much quicker way of procuring a stock of young tubers for seed, by growing them in a cold frame, or on a gentle hot-bed, and taking the cuttings as soon as they appear; it being only necessary to cut off a leaf, with a small piece of wood without a joint, which is inserted in the mould (ordinary cutting mould) to the leaf—a pot of 6 inches diameter would contain about 50 cuttings—the pots should then be placed in a gentle heat, and kept close, either by means of bell-glasses or otherwise. Before the cuttings strike root they will throw out small tubers on the surface of the mould (similar to those sent out to the public); as soon as they are the size of a pea, they should be hardened off, and planted out thickly in the open ground, when many of the large ones will be fit for use the same season, if required. A good gardener, with a stock of 50 small tubers, ought to obtain from two to three thousand roots fit for the next year's seed."

There can be no doubt that the plant deserves the immediate aud serious attention of all gentlemen's gardeners. —*Gardener's Chronicle, 23rd December,* 1854.

Since the account of the Chinese Yam *(Dioscorea Batatas)*, which we gave a few weeks since, a further report by M. Decaisne upon the result of last year's experience in France has reached us. It appears from this statement that the root has excited the greatest interest in that country, that it is already regarded as a sufficient recompense for the disasters which attended the potato disease, and that the public establishments are overwhelmed with applications for it from all parts of the country. The substance of M. Decaisne's statement is as follows :—

About the middle of April, when he considered the danger from frost to be over, he planted out in the garden of the

Museum of Natural History some pieces of the roots. Some were taken from the upper and smaller part of the tubers, others from the thicker part. The first were scarcely as thick as the little finger, and averaged 2¾ inches in length; the others were much larger, and formed slices or cross sections of a cylinder, each 1¼ to 1½ inch thick on the edge. Three tubers weighing from 10½ to 14 ounces were planted whole, in order to compare their produce with that of the cut sets. The plantation was made in an open border on the level, and not on ridges, as ought to have been done, a circumstance, however, which in no way affected the growth of the tubers; it only rendered the taking up difficult. The distance between the plants was 19½ inches every way; this was another mistake, for, according to the judicious observations of M. L. Vilmorin, they should have been much wider apart. The short time which has elapsed since the introduction of the Chinese yam, prevents M. Decaisne's determining what may be called a good or a bad year for it; the future alone will show under what conditions of climate it best succeeds. All that can at present be said is, that in 1854 the growth of the plants was uniform, that their long twining stems grew vigorously, and were thickly covered with leaves, that abundance of flowers were produced (they were all males) about the beginning of August, and finally that vegetation ceased, and the leaves began to acquire a yellowish tint after the middle of September, thus indicating that the tubers had nearly come to maturity.

With the exception of some specimens kept apart for other experiments, all the plants were separated into three distinct lots. Two of these lots were staked—one with strong stakes 10 feet or more in height, the other with stakes 6 or 7 feet high. The stems twined round the stakes very regularly, in the same way as running kidney beans, and soon grew beyond them. In the third lot the plants were left unsupported, and their stems spread over the ground without taking root, twining amongst each other; these did not nearly attain the length of those which were staked. In no case were the plants either earthed up or hoed, operations which did not appear to be required. The tubers were taken up on the 6th of November. The following return shows the results of the different modes of planting and cultivation which were adopted.

A. *Tubers planted entire, weighing on the average* 10½ *oz. each.*—Three tubers produced very vigorous plants, each of which formed one fresh tuber; two of these were enormous, and quite out of the common run, one weighing, when taken up, about 3lbs., the other 2lbs. 9 oz. The third was attacked by the grub of the cockchaffer, and only yielded pieces; its stems, moreover, withered in August. The tubers which had been planted were shrivelled without being much decayed or changed. Notwithstanding the size of the two new tubers obtained, this mode of planting is considered to be very objectionable.

B. *Plantation made with pieces of the tubers varying in length and thickness.*—Plants with stakes ten feet long. This lot consisted of 16 plants, of whch one produced two middle-sized tubers, weighing together fully 11½ oz., and which ought to be considered as only forming one. Weighed carefully three days after the tubers were taken up, and when dry and clean the following was the result:—

No.	Grammes.	No.	Grammes.
1	095	9	175
2	140	10	350
3	390	11	185
4	540	12	205
5	260	13	95
6	330	14	100
7	390	15	100
8	320	16	30

[Total 3 kil. 705 grammes, about 8 lbs. 2½ oz.; or a mean per tuber of 8 oz. $\frac{168}{1000}$.]

** Plants with stakes 6 to 7 feet high.

The plants, of which there were 28, also produced only one tuber each, of the following weights :—

No.	Grammes.	No.	Grammes.
1	40	15	550
2	50	16	270
3	55	17	380
4	195	18	370
5	690	19	270
6	550	20	265
7	520	21	220
8	790	22	230
9	540	23	225
10	420	24	355
11	420	25	55
12	440	26	165
13	450	27	210
14	765	28	175

[Total, 9 kil. 665 grammes, = 21 lbs. 4½ oz., or on the average 12 oz. $\frac{175}{1000}$ pertuber.]

*** Plants not staked, their stems straggling on the ground.

The number of plants was 13, and they gave the following results :—

No.	Grammes.	No.	Grammes.
1	488	8	245
2	475	9	150
3	460	10	140
4	488	11	120
5	400	12	110
6	495	13	55
7	290		

[Total, 3 kil. 916 grammes, = 8 lbs. 6½ oz., giving an average of 10 oz. $\frac{625}{1000}$ per tuber.]

The sum total of the produce of the three lots planted with pieces of tubers gives 17 kil. 286 grammes, or 38 lbs. 1¾ oz., as the produce of 57 plants, which is at the rate of rather more than 10½ oz. for the average weight of each tuber.

In this calculation the quantity of space on which the plants grew is not taken into account, nor would it have led to any useful inference, because as has been already stated, *the plants were too far apart. But when he takes into consideration* the perfectly tap-rooted nature of this plant; the shortness of the slender lateral roots, which are not more than from 3 to 3½ inches long; and moreover the large development of the stem and leaves, which clearly indicates that the *plant lives principally on elements dissolved in the atmosphere,* M. Decaisne *infers that at the distance of 10,* or even 8 inches every way, the plant would have sufficient space for its proper growth. There would thus be from 16 to 25 plants in a square metre. Taking the 20 plants to produce on an average each 10½ oz. of tubers, we have about 13¼ lbs. per square metre, or a total of about 23 tons 17 cwt. of tubers per acre. This is double the average weight of potatoes produced in France on the same space of ground.

So large a produce M. Decaisne admits to be entirely hypothetical, and calculated for the best conditions of soil and temperature, in the climate of Paris; it is also made upon the supposition that the whole of the ground is occupied. But although the computation may be too high, and notwithstanding that the Chinese yam costs more to plant than the potato, M. Decaisne has nevertheless arrived at the conclusion that the produce of the *Dioscorea Batatas* will exceed that of the potato, and that the greater difficulty in taking up will be compensated by the greater amount of nourishment which the tubers contain. It is in order to diminish the labour of taking up that he recommends the Yam to be planted on ridges, following as much as possible the Chinese method described in our former article. The reasons upon which this opinion is formed are the following:—

The tubers of the Chinese yam were in general from 13¾ to 19½ inches long; seldom more. The upper third is small, perhaps as thick as the little finger; this is, in his opinion, the only part that should be kept for planting, and, in most cases, three or four slices, large enough to form vigorous plants, may be obtained; the rest of the tuber may be used *for food.*

It is important that the entire tuber should be taken up, especially since its lower extremity is always the largest part, and that which is richest in starch. By laying out the ground in ridges or narrow beds 10 or 12 inches high, the gardener *has only to dig a spade's depth in the side of the ridge* or bed, in order to reach the lower end of the root; and by turning over the ridges, so as to level the ground at the same time, the crop may be taken up without difficulty. It is evident, indeed, from what has been stated, that if the sets are planted sufficiently close, the labour in taking up will not be greater than that required for the same weight of potatoes. M. Decaisne hesitates to settle positively the breadth of the beds, or the distance from ridge to ridge; but he suggests that a space 20 inches broad planted with three rows of yams would answer very well. The furrow or space between the beds should not be more than a foot wide —just enough for a man to work in. He adds that the plants should not be staked, because their stems if allowed to spread over the ground preserve its moisture; and also because they may be made to root by a sort of layering similar to that practised by the Chinese, who by that means obtain a considerable increase of produce. This mode of layering is described in our former articles.

It should be understood that M. Decaisne only speaks of light free soils, and not of those which are compact and harden much with the action of the sun. The former are, in fact, those in which the may succeeds best. In China it is exclusively grown in sandy soils where few other green crops thrive.

M. Decaisne regards the Chinese yam as superior in quality to the potato. Although no comparative analysis of the two has been made, he believes that the Chinese yam is much the richer in point of nutritive principles. Its roots are white as snow in the interior; they neither contain visible fibres nor tough woody matter, and when boiled they become so soft that a slight pressure converts them into a paste, which he can only compare to that of the finest wheaten flour. Cooked by steam or roasted, they look and taste like the best potatoes. They have one advantage, which every one will appreciate, namely, the short space of time required for cooking. Two pieces of tubers, of the size of a hen's egg, one the Chinese yam, the other the *Batate blanche*, were both put into boiling water at the same time with a Dutch potato of the same size; the first and second were done in ten minutes, the third in 20 minutes. And we must recollect that the facility with which the potato may be cooked is one of the causes which have greatly contributed to the popularity of the potato in a culinary point of view, as it requires but little fuel.

Another point of great importance to cultivators is that it may be kept easily for a year, and perhaps longer. We all know that the potato is certain to sprout in spring. The Chinese yam is wholly free from this disadvantage; it is neither affected by cold nor heat, and perhaps not even by moisture. Left in the ground, it remains alive through the winter without injury, as has been proved by a root which passed there the last severe winter, and pushed freely in spring; so that it is a hardy plant in the widest acceptation of the term.—*Gardener's Chronicle, 13th January,* 1855.

Notice of various Fibrous Materials: Flax from the Punjab; Basts from Burmah and Arracan; Sida rhomboidea from the Society's Garden; and Asclepias tenacissima from the Midnapore district.

Since the publication of the last number of the Journal, several specimens of fibrous materials have been submitted to the Society. The receipt of these specimens, with some information respecting them, were duly recorded in the proceedings for 1854. But it is, nevertheless, considered desirable to re-introduce in this place, with the view of giving them greater publicity, the following particulars regarding such of these fibres as are deemed to possess more than ordinary interest:—

I. Fibre of the Flax plant, *Linum usitatissimum,* raised in the Garden of the Agri-Horticultural Society of the Punjab and received in June, 1854, with the following letter from Henry Cope, Esq., Secretary of the Society:—

"I have the honor to forward herewith a small sample of flax prepared in the Garden of the Agricultural and Horticultural Society of the Punjab, from plants reared from seed supplied from Saharunpoor under the name of Russian flax seed. It has been prepared by Corporal Kennan, of H. M. 10th Foot, a native of Monaghan, conversant in the manufacture of flax, but is coarser than it might otherwise have been, in consequence of our finer heckles not being ready. It is very desirable to obtain an early opinion of this sample, and the Society will be greatly obliged by your obtaining one as soon as possible. I may add that the produce was 6½lbs. of this quality from the twenty-eighth part of a beega, that there was besides 8lbs. of tow and 8lbs. of seed. The man who prepared it, considers it equal to Egyptian. flax. In this country the people consider the seed alone sufficiently remunerative to induce a cultivation on a small scale."

The specimen was referred to the Flax and Hemp Committee of the Agricultural and Horticultural Society of India, and two of the members reported on it as follows :—

Mr. Stalkartt writes:

"This flax is decidedly the best specimen of this country's growth, and I should say a good merchantable article. It is very difficult to give a thorough report upon it, as we have none from Europe to compare it with. From the test it did not appear very strong, and from its smell I should say that oil had been used in the preparation. Perhaps with an improved method, it would have greater strength, as oil, generally speaking, deteriorates greatly the strength of hemp and flax. I would like to see it in greater bulk; a handful is not a fair sample."

Mr. Haworth reports:—

"On the whole I think the preparation of this fibre does great credit to Corporal Kennan; any short coming is owing to the finer heckles not being ready. I think the length of fibre is good; the color of the greater part is bright and healthy, and that portion shews good strength. There is however a small part of the sample of a dark dull color, which I think is caused by over retting, and that portion of the sample is, as might be expected, weaker than the rest.

"If the natives of this country could produce such flax as this specimen under notice from the immense fields now grown in Bengal for seed only, what an enormous amount would be added to the value of our exports. I would suggest that Mr. Cope should be asked to send us a small sample of the seed like that from which this plant was grown, as well as some of the seed which the plant itself produced,—also to ask him to detail the process of retting, and the time taken in separating the fibre from the woody part. If a small quantity of the dried plant could be sent here, it might be tried both by the warm water process of Mr. Schenck, and the high-pressure steam process of Mr. Watt."

Mr. Haworth's suggestions were brought particularly to Mr. Cope's notice, but the Society have not heard further from him on the subject. The Society have, however, adopted the latter suggestion in another form, having recently (May, 1855) forwarded to the Chamber of Commerce, Dundee, a bale of flax straw, raised at Allyghur, from native seed, and grown after the native fashion, to be tested by the new processes. For this straw, they are indebted to C. Gubbins, Esq., of the Civil Service, one of the oldest and most zealous members of the Society. It may be mentioned, before quitting the subject of the Punjab flax, that a small quantity was made up into "log-line" by Messrs. W. H. Harton and Co., rope-makers of this city, for the purpose of having its qualities tested at sea. Capt. Tregear, of the screw steam-ship *Formosa,* to whom the line was sent for trial, reports it as superior to any before supplied. He adds "it has been in continual use during the voyage to China, and is still (January, 1855) good. The log-line before supplied has generally worn out after 10 or 15 days' use."

II. The *Basts* of Burmah and Arracan. The Society having received in June, 1854, through the Government of Bengal, copy of a despatch from the Court of Directors, with a report from Dr. Royle on the subject of Indian substitutes for Russian bast, (see p. 8 of this number of the *Journal*), a communication was made to Major Phayre, the Commissioner of Pegu, who superintended the selection of the Arracan specimens for the Great Exhibition, for some further information on the subject. Major Phayre was kind enough to send, in reply, two specimens with the following memo. on the Bast produced in the Province of Pegu:—

"This substance, termed by the Burmese Shaw, is obtained from the bark of three different trees, stated by Mason, in his notes on the botany of Burmah, to "belong to the genera *Hibiscus*, *Paritium* and *Sterculia*."—It is used *by the Burmese extensively for cordage.*[*]

"I send two specimens of the Bast, containing each about *one maund. That marked No. 1 is termed Shaw Nee*, or red Shaw. That marked No. 2 is called Shaw Phyoo *or white Shaw.*

The price of each specimen was Rupees 4-6-0. This is about double the ordinary price, because during the rainy season people do not readily enter the forests to collect the material. It is generally brought to market in the state of the specimens now sent, being cut into short lengths for the convenience of carriage. It might, without difficulty, be procured of any length up to 40 or 50 feet.

During the months of December, January, February, and March, I believe, it would not be difficult to procure in Rangoon, or its vicinity, two or three hundred tons of this material."

Mr. Willis, a member of the Flax and Hemp Committee, to whom the above two specimens were referred, thus writes regarding them:—

"I have had no experience in this vegetable bark and fibre. Speculatively considered, it seems to me suitable, primarily speaking, for mat-makers. Secondarily for cordage makers, and thirdly, perhaps for paper-makers. But for any of these purposes it has yet to find its value both here and in England, from trials of its utility in each department. It would seem that the Burmese apply it as far as is yet known only to the purpose of making cordage. If Major Phayre could send us specimens of the various Burmese cordage derived from it, with any information as to the process of its main plantation, it might be valuable to our Society.

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[*] In a letter forwarding this memo., Major Phayre states that he has never heard of this material being used by the Burmese for making mats.

I perceive that on moistening it, and freeing the fibre from its vegetable pulp, that it has multitudinous subdivisions of a fine nature, each possessing moderate strength.

Inasmuch as the specimens now presented shew great tenacity, toughness, and flexibility, I should deem the article well suited for making bast mats, of which a large use and consumption is found in England.

In preparing it for this purpose, I would suggest that the bark, whilst green, be slit up into thin strips, of as long lengths as the trees will admit, and that the strips be made of various good widths, and be then folded up in lengths convenient for exportation."

Mr. Stalkartt, another member, observes, "I have seen this bark before, and have a small quantity, which is now being made into a double thread like coir yarn. It is very strong, and if made into threads, double, like coir yarn, would, I have no doubt, be extensively used for running rigging."

Mr. Stalkartt has since reported that the women whom he employed found it so stubborn, that he could not get them to make up a sufficient quantity for a rope.

Shortly after the receipt of the Burmese specimens, the Society were favored by Capt. F. W. Ripley, Principal Assistant Commissioner of Arracan, with sundry specimens of shaws or basts from that Province, as detailed in the following letter, dated from Akyab, 4th October, 1854:

"I have sent up by the *Fire Queen*:—

2	bundles	Shaw Nee,
1	,,	Batharan Shaw,
1	,,	Thenban Shaw,
1	,,	Shaw Phroo.

A small bundle Nandzoung Shaw; do. Gyee Kywot Shaw, with a piece of rope attached to each of the latter.* The

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* These two specimens did not reach the Society.

Nandzoung Shaw and Gyee Kywot Shaw are very strong fibres, being made from some of the creepers that abound in the jungle. The hill tribes use them principally for nets, &c., to snare wild deer, &c. The others I described in my letter to Mr. Blechynden in 1852, and gave full particulars as to the price, &c."

In the letter referred to, as written in 1852, which is published in the *Journal*, Vol. VIII, p. 147, Capt. Ripley describes both the Shaws,—Nee and Phroo,—as "large trees, which grow in all the jungles of Arracan, to the height of 30 feet or so, in girt about 24 or 27 inches; the bark is stript off, soaked in water, and treated the same as jute. From the fibrous material a strong rope is made by the Mhugs. The raw material is procurable in the Akyab bazar for about Rs. 2 the maund. The Batharan Shaw is the same as the other two, but is scarce, and not procurable in any quantity. I have never seen this for sale in the bazar."

Mr. Stalkartt reports that the Thenban Shaw is not of such good quality as that found in Assam and Burmah, and also in America. The Batharan Shaw, he is of opinion, would answer for watling for houses.

Mr. Haworth (another member of the Fibre Committee) observes that the Thenban Shaw appears like a coarse kind of Russian Bast, and he thinks it might be used for making various kinds of matting, and bags for paddy, and for other rough produce.

In December following, Capt. Ripley sent further specimens of Bast, and also some jute, with a communication of which the following is an extract:—

"I have by this steamer sent 8 bales, containing further specimens of the fibres of the Province.

1. Thenban Shaw, the bark of a shrub 7 or 8 feet high.
2. Are two kinds of jute from the Lémroo River country, in the Akyab district. The Heng Shaw is eaten as a vegetable.
3. Shaw Nee or red Shaw; Shaw Phru or white Shaw.

4 and 5. Gyee-gywot-Shaw, the fibre of a creeper used for nets and boat cordage, and for other purposes.

5, 6, and 7. Gnandzoung Shaw.

8. Dhau Shaw, the inner bark of a tree about 30 feet in height. This is very scarce.

The others are procurable in the dry weather, after some short notice, but I am afraid that the present method which the Hill tribes use of collecting the barks Shawnee, Shawphru, and Batharan Shaw, of which I sent specimens previously, will render the supply very uncertain. They cut the tree down, to render the operation easy, thus preventing any further crop in the ensuing year.

The stripping the tree does not, if carefully done, kill it, but as they are only found in the heavy jungles, no regular stop can be put to the practice."

It will be seen from the letter of Mr. Gordon (*ante* p. 10,) that he thinks highly of the specimens of Shaws which were sent for his inspection, viz. the Shaw-phru, and Patha-you-Shaw; that they will prove when made into mats excellent substitutes for Russian mats, being very strong, pliable, and tough, when wetted, and easily divided into small portions, for the purpose of tying, &c., and entirely free from knotty places. We take the following description of certain specimens of Arracan Bast which were sent to the Great Exhibition, from Royle's *Fibrous Plants of India ;* it will answer also for those received from Capt. Ripley :—

"*Thenban Shaw.* Coarse-looking, and of a reddish-brown colour, but divisible into a number of very thin layers, with a good deal of flexibility, and some toughness.

Pa-tha-you Shaw, [probably Capt. Ripley's *Batharan Shaw.*] Strips seven feet in length, and fine in texture, light-coloured, formed of several easily divisible layers : the outer layers rather dense and compact, and the inner cancellar. A *Musæ* species (?)

Shawphyoo [*Shawphru* of Ripley.] Long, thin, smooth layers; *light-coloured, tough,* and *flexible; easily divisible* into still finer layers.

Shaw-nee, of a reddish brown colour, rough and coarse, best twisted into rope.

Eee gywot Shaw, [Gyee-gywot-Shaw of Ripley] Strips 5 to 6 feet in length, composed of several layers; of which one side is smooth and compact, but the layers on the other side thin but cancellar, all having a considerable degree of toughness."*

III. Fibre of the "Suffaid Bareeala" of Bengal, *Sida rhomboidea,* Roxb.: the produce of the Society's Garden.

In 1851, Major Hannay forwarded to the Society a sample of the fibre of *Sida rhomboidea,* from Upper Assam, which was most favourably reported on, (see *Journal,* Vol. VIII, p. 62.) In July, 1853, Major H. sent the Society some seed of this plant, which was sown in the garden immediately on receipt. The plants produced by that sowing ripened seed in the following November. This seed was sown in June, 1854, and the above fibre was obtained from it in October. The following are the reports of two of the members of the Society's Hemp and Flax Committee :—

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* While this paper is passing through the press, we have met with the following notice respecting the applicability of shavings of the Bast for paper making. It is published in *Chambers Journal of Popular Literature, Science and Arts,* for May, 1855, under the head of late inventions and projects in America:—

"The growing scarcity of rags for paper making has latterly pressed on the American as well as the English publishing world; and in the States, as here, a variety of articles has been suggested to supply the deficiency, the most successful of these seems to have been the pulp made from shavings of the bass-wood. The bass is a comparatively valueless wood, having hitherto only furnished the thin strips of bass of which the common kinds of mats are formed. The discoverer is Mr. G. W. Beardslee of Albany, State of New York, where a number of a newspaper, according to late accounts, was printed on paper made entirely from bass-wood. The pulp is said to be manufactured cheaply, a matter of the first importance, for the real difficulty in the way of such discoveries is the cost of preparation. The Albany *Evening Journal,* the newspaper employing bass-wood paper, speaks approvingly of Mr. Beardslee's discovery, and appears to think that the question of a substitute for rags is at length practically set at rest."

"The fibre from Major Hannay, of Upper Assam, appears to have been reported on in the 8th Volume of the Journal now not before me, but I have some recollection of a favourable report having been made upon it; and I perceive now, that time and age, being three or four years ago, have impaired both its strength and colour.

I have now to report on the specimen from our Gardener Mr. McMurray's growth and preparation.

I find it of excellent length, being about ten feet. It is very completely freed from all ligneous adherents, and is in excellent condition, having its silvery brightness or lustre and colour in high perfection.

The fibre is remarkably round; it is also fine, being somewhat coarser at the root end than in the upper parts, and near the top extremity it becomes exceedingly fine.

The strength, although inferior to some of the best *or strong* fibres, which have been before us, is nevertheless excellent.

I consider this fibre worthy of the best attention of those who may be engaged in vegetable fibrous productions, and more especially so, as it seems capable of being grown so well in Lower Bengal.

Our Gardener, Mr. McMurray, would no doubt be able, on call, to give all needful information as to its culture and preparation, and if he were requested to place some minutes of his treatment of the subject before the Society, its publication might be found very useful, and with this view I make the suggestion.

JOSEPH WILLIS."

"I have given a careful examination to the specimen of Rhomboidea fibre, grown and prepared in the Society's garden. It is really a very nice, and in my opinion likely to be a very useful fibre, it is good colored, bright and strong, and a fair length, and I think it might be put to very many useful purposes by a manufacturer accustomed to work up jute; it is so like the better qualities of this latter article, but more silky, that a manufacturer could make a fair trial of it, without the great inconvenience of altering his machinery, and which is a great matter in the introduction of a new article.

I should wish to see some quantity of it prepared and sent to some of the Dundee spinners for trial and report thereon.

W. HAWORTH."

Following out the suggestion of Mr. Willis, we introduce a brief notice from the Society's Gardener on the cultivation of this plant and preparation of the fibre. The suggestion of the other member (Mr. Haworth), has also been carried into effect, by the despatch of a bale of the fibre to the Chamber of Commerce at Dundee:—a smaller specimen has likewise been sent to Messrs. Marshall and Co. of Leeds.

Dr. Roxburgh mentions *(Flora Indica,* Vol. III. p. 178), that one species of this genus, *Sida abutilon* (now *tiliæfolia),* is cultivated in the neighbourhood of Pekin, under the name of *King-ma,* as a substitute for hemp and flax; seeds were received from China by him, and sown in the Botanical Garden, at Calcutta. Dr. Royle informs us *(Fibrous Plants of India)* that seeds of the same plant were received a few years ago by the Horticultural Society of London, and he saw a fine crop of the plants in their garden at Chiswick, which seemed about eight feet high.

"The *Sida rhomboidea* fibre-yielding plant, cultivated in the Society's Garden in 1854, was sown on the 16th May, previous to which the ground had been thoroughly ploughed and harrowed three times and well cleared of the weeds. The seed was then sown broad-cast, as the object was to produce a thick crop of plants, standing close together, to grow up into straight stems, without branching, which is better adapted for the production of fibre: the treatment of the crop was afterwards confined to careful hand-weeding, which took place when the crop had attained three or four inches high: no more labour was required until the crop was fit for cutting, in September; at that time it was cut close to the ground by coolies, who used small hand sickles for that purpose. The stalks when cut were laid down in handsfull on the stubble, and then put into heaps and strawed over with grass rubbish, for the purpose of causing fermentation to take place in the leaves, which occurred in the course of four days. At that time the crop was sorted, the small and large being tied up separately in handsfull; of these handsfull from fifteen to twenty were bound into three feet girth sheafs, and then put into the steep, the buttend of the sheaf was placed next the side of the tank, and loaded with brick, merely to keep the whole below the surface of the water. The object of tying the stalks up in handsfull, previous to sheafing, is, that at the time of washing, they separate one from the other without any trouble or injury to the fibre.

The length of time the fibre took in the steep was twelve days. At that time it was separated from the pith by coolies standing in the water, previous to which they had been furnished with small hand mallets, to beat the fibre and stalks lightly, in order to raise the fibre from the pith; they then broke the buttend of the stalks one foot in length, and shook that portion of the stalks into the water, after which they cast that portion of the cleaned fibre round their right hand, and jerked the remaining portion from the pith in the water; part of the water was wrung out of the fibre previous to casting it on the grass bank, where a man was stationed to pick up the fibre, and hang it over a bamboo line or frame work, which had previously been erected to dry the fibre upon.

The only other work done was perfectly drying the fibre in the sun.

In conclusion, I have to remark, that the ground on which *this fibre was grown, was of a gentle sloping nature, the* lower end of which consisted of a heavy *clay soil, and that* at the upper end of a sandy loamy texture; on this part of the ground the plants grew from four to five feet high, whereas at the lower, the plants were stunted, and did not grow more than two feet high."

IV. Fibre from a creeping plant, commonly found in the Midnapore district, presented by G. F. Cockburn, Esq., C.S., at the general meeting of October, 1854.

This specimen was also referred to the Committee who reported as follows:—

Minute by Mr. Willis:—

"In these specimens a fibre of remarkable character is presented to us.

Its length is not great, varying generally from one foot to two feet, and averaging probably about twenty inches.

It is fairly round in its structure; moderately flexible; possessing a degree of resistant harshness, which might probably be abated with a very little more steeping or washing, and then without diminishing in any objectionable degree either its strength or brilliancy.

It is of good fair fineness, and by beating or dressing may be rendered still more fine, inasmuch as its presently presented fibres, are capable of subdivision; but this had perhaps best be left as a future work, for the preparative spinner, unless it could be more easily and cheaply effected here during the greater greenness of the fibre.

Its colour is excellent, being silvery with a slight tinge of drab.

Its length is quite sufficient for all purposes of machine-spinning, &c.

Its great merit seems to be in its most remarkable strength.

It is desirable indeed that we should acquire more knowledge of the plant, its localities, and habits, &c., &c., and that we should ask this of Mr. Cockburn, with any other information in regard to its preparation which he may be able to give."

Minute by Mr. J. Stalkartt :—

"I agree in all that Mr. Willis has stated, but should like something more than a sample,—viz., 10 mds. It is not of sufficient length to be quickly spun by hand. Therefore not fit for rope, but might do for lines."

Minute by Mr. W. G. Rose :—

"I concur in Mr. Willis' report, and think with him that we ought to acquire more knowledge of the plant, and the mode of preparing the fibre, and cost of production, which Mr. Cockburn will no doubt be kind enough to furnish us with."

Since the above was written, Mr. Cockburn has sent a few living specimens of the plant yielding the above fibre, and it has been recognized to be the *Asclepias tenacissima* of Roxburgh, the "Jeetee" of the Rajmahl hill people, of which they make their best bowstrings, that last for five years, though exposed to all sorts of weather. Roxburgh gives the following account of the mode of preparation, &c., in his *Flora Indica,* Vol. II, p. 52:—"During the rains, they cut the shoots into lengths at the insertion of the leaves, peel off the bark, and with their nails, or a bit of stick on a board, remove the pulpy part. A person accustomed to this work, will, I am told, clean as much as six pounds of the fibres in one day. These fibres, and those of the bark of the Malay plant "Battang-cullooee," or "Poolas," (*Urtica tenacissima,* Roxburgh) are by far the strongest fibres which I have met with in the vegetable kingdom, far exceeding those of the leaves of my *Sanseviera Zeylanica.* A line made of common hemp for a standard, broke with 158 pounds when dry, and 190 when wet; the average of several trials. A similar line of this substance broke with 248 when dry, and 343 when wet, while one of "Battang-callooee" broke with 240 when dry, and 278 when wet."

In 1844, the Society received specimens of the same fibre, from Mr. C. B. Taylor of Palamow, whose communication, together with a report on the strength of rope made from it, in comparison with other fibrous materials, will be found in Vol. III. of this Journal.

A. H. B.

Selections, &c.

On the Natural Law by which Nitrate of Soda, or Cubic Saltpetre, acts as a Manure, and on its Substitution for Guano. By the PRESIDENT.

Though the plain path of practice is in agriculture generally the safest, it will not be useless for that very practice sometimes to deviate into theoretical considerations, the result of which may render the steps of experience more sure; just as the sailor, while buffeting with a stormy sea, ascertains his course by the abstruse calculations of the astronomer. Such a field of inquiry is, I believe, presented to us in the use of saltpetre as a manure.

This substance, or rather these substances—as there are two, the ordinary and the cubic saltpetre—consist of an acid, the nitric acid, and an alkali, either potash or soda; nor could any one, viewing the effect of these individual salts, decide whether the acids or the alkalies were the source of their manuring action. Looking, however, to the nature of other fertilizing matters, I ventured, so long ago as the year 1841,* to express the belief that their power would be found to reside, not in their alkalies, but their acid. Still the arguments then adduced were not thought conclusive, and in books subsequently published † it was yet said that the potash and the soda very probably were the manures, for the mineral theory was still in vogue.

Last year again, having some fresh facts to bring forward on nitrate of soda, I endeavoured to support the same view by showing further that other nitrates also, such as the nitrate of lime found in old walls, have likewise a manuring effect.

Still the question has remained open, and the highest chemical authority in Edinburgh has recently questioned the manuring power of nitric acid; nor can any one blame that distinguished philosopher, Dr. Gregory, for exercising caution in admitting such an hypothesis. For if it be true that all substances containing nitrogen, in whatever form, are thereby constituted manures, this will not be a mere rule of farming, but an important law of vegetable physiology; the more important, perhaps, because we hardly know any other law under which vegetables acquire their substance, excepting that by which they absorb carbonic acid in day-light. Indeed his opponent, Dr. Wilson, in an able paper‡ read before the Royal Society of Edinburgh last spring, advocated the efficiency of nitric acid with some hesitancy, admitting that "soda might be the more important constituent of nitrate of soda considered as a fertilizer." So long, then, as the productive power of nitric acid rested upon abstract reasoning, however cogent, the general law could not be regarded as finally valid. It appeared, therefore, desirable to bring the matter to a decisive experiment, and by employing the two elements *of nitrate of soda, the acid and the alkali, separately, to ascertain in which of the two the manuring virtue is seated. It would be scarcely possible*, of course, to use nitric acid upon acres of land, *nor did it seem necessary*, for we know the vivid green and the rapid growth induced upon grass by nitrate of soda. Whichever, therefore, of its two elements used side by side with itself, the alkali or the acid, produced the same vivid green and the same rapid growth, must clearly be the active principle of the combined salt.

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* Journal of Royal Agricultural Society, Vol. II. p. 123.

† "Both Nitre and Nitrate of Soda are used as manures, and it is still uncertain whether the acid of these salts contributes to the good effect, or whether they act by their bases alone."—*Outlines of Chemistry*, by O. Gregory, M.D.

‡ Transactions of the Royal Society of Edinburgh, xx. 41, read April 18th.

In applying nitric acid for the first time as a manure, whatever confidence one might entertain in a scientific induction, one could not see the most powerful of acids eating away the very spoon which held it, or feel its acrid fumes in the lungs, without some misgiving as to its action upon the tender spongioles of the grass's roots. Considerable dilution was of course necessary, and the first point to be ascertained was the amount of water required to be mixed with the acid for the safety of the living fibres. Six stripes, then, each five feet long and one broad, having been marked out by pegs upon a grass-plot, these received severally from a watering-pot a pint and a half of water containing nitric acid, the proportion of which was successively decreased. Two other stripes also received nitrate of soda in different quantities. The three strongest doses of nitric acid had burnt up the growing grass by the following morning, but, to my great satisfaction, in about a week the next stripe showed unequivocal marks of benefit from the nitric acid. Soon after, one weaker solution had begun to act. It was only the weakest dose of all which produced no effect. The three strongest too had killed the blades alone of the grass, not the roots, which in about a fortnight sent up a new crop of deeply discoloured herbage, resembling that produced on their side by the nitrate of soda. The quantities of acid applied are given in the following Table :—

September 22.

Manure employed on area of 5 square feet.	Quantity in Drachms.*	Water in Pints.	Effect on Grass, perfection being taken at 10.
Nitrate of soda	6	1½	10
Ditto	3	..	9
Nitric acid of commerce ..	8	..	8
Ditto	6	..	8
Ditto	4	..	8
Ditto	2	..	8
Ditto	1	..	2
Ditto	0½	..	0

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* The drachms express, of course, the *weight* of the dry salts and the *measure* of the liquid acid.

At this time, November 15th, the effect of the waterings is still very conspicuous, the grass so treated being not merely darker but thicker, and three times longer on the best lots than on the adjoining turf.

Having thus discovered that nitric acid did act, and having ascertained the safe dose, I made two further trials, which included the alkalies separately, soda and potash, and also included ammonia to serve as a further test. In both trials the nitric acid acted decidedly. The alkalies, neither of them, produced even a trace of effect on the colour, or on the growth of the grass :—

October 3.

Manure employed on area of 5 square feet.	Quantity in Drachms.	Water in Pints.	Effect on Grass, perfection being taken at 10.
Nitrate of soda	6	3	10
Nitric acid	4	..	8
Ammonia*	1⅔	..	5
Soda*	1⅔	..	0
	October 4.		
Nitrate of soda	6	1½	10
Ditto	3	..	5
Nitric acid	2	..	7
Ammonia	1⅔	..	5
Potash*	3	..	0

The success therefore of the experiment was complete. The question being whether in saltpetre the alkalies or the acid contain the active principle, we have found upon a given soil the alkalies absolutely inoperative, while the acid has acted exactly like saltpetre itself, and like ammonia. The action, indeed, does not follow any precise proportion to the quantity of nitric acid employed, but neither does it to the quantity of saltpetre. For both, as is the case with other manures, there is no doubt a maximum, to exceed which is useless, and may even be prejudicial. But the action of the nitric acid was palpable, unfailing, and indeed very powerful. On many other parts of the grass-plot sprinklings of the diluted acid were poured, and were everywhere followed by a dark luxuriant vegetation. We may now therefore assume, with unhesitating certainty, as a great law of nature, that *substances strengthen vegetation mainly by their contents of nitrogen.*

This law sheds at once an harmonious light over the scattered facts which the unlettered husbandman has learned while still groping in the darkness of practice. If we look at the practice of manuring only, we find the most dissimilar substances applied to the soil—sprats or sticklebacks here ; woollen rags, or shoddy, or hornshavings there ; sea-weed in another place, rapecake elsewhere. All these refuse matters, however, agree in containing

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* The carbonates of ammonia, soda, and potash.

undeveloped nitrogen. Again, lupines, sown for the purpose, are in some countries ploughed in as manure, as are the remains of the clover-crop, both *also containing nitrogen undeveloped. In dung and in liquid manure the* nitrogenous matter is *partly* combined with hydrogen, and has thus become ammonia. In other manures, as soot and gas-water, the pungent smell shows the *full* development of ammonia. Again nitrogen may combine not only with hydrogen to form an alkali, ammonia, but with oxygen also to form an acid. That acid, in whatever combination, whether with potash, soda, or lime, is equally active ; nay, as I have now shown, the consuming liquid itself is able to nourish the tender herbage of the green lawn. This same law explains moreover not fertilizing substances alone, but the fertility of the soil itself also throughout many wide tracts. Not only are the plains of Hindostan made fruitful by their native saltpetre, but the famous Tchornoi Zem, or black earth, which over wide tracts around Tamboff bears wheat crops in endless succession, and will not endure to be dressed with dung, has been found by late analysis* to be charged with nitrogenous matter, the remains of living organisms. Nay, when poets† tell us that battle-fields are rendered fertile for ages by patriot blood, we now understand scientifically this mournful memorial of human slaughter.

The admission of this truth has been delayed, according to Dr. Wilson, by "a reluctance in teachers of chemistry to admit two sources of nitrogen for plants, because it complicates their statements and multiplies their formulæ." The awkwardness is no doubt the greater, because the substances in question are not merely duplicate, but of opposite natures ; the one, ammonia, being alkaline, and the other acid. Dr. Wilson suggests, not unjocosely, that the exclusive advocates of ammonia should assume the conversion of the nitric acid into ammonia before any organic compound is developed, and thereafter carry out the ammonia theory as before.‡ On the other hand, the distinguished chemist of Cirencester College, Dr. Voelcker, informs me that, in his opinion, "plants in general are *more* dependent upon nitric acid, as the source from which they derive their nitrogen, than upon ammonia." Within soils containing lime—and most soils contain lime, either natural or applied—Dr. Voelcker thinks that nitrogenous manures are converted not into ammonia, but into nitric acid. Now, of the manures above enumerated, two only are strictly ammoniacal, namely, soot and gas liquor. Of the others, in some, such as fish, rags, &c., the nitrogen is as yet undeveloped, and may therefore assume in the soil the form either of ammonia or nitric acid, we know not which. In fresh dung and urine it is *mainly* undeveloped. Even in guano, Dr. Voelcker has found it developed only to the extent of one quarter. But in all these cases he conceives the undeveloped nitrogen to be changed within suitable soils into nitric acid. Further investigation is evidently required. The general law is established as to nitrogenous matters : but whether they act upon plants in two forms, ammonia and nitric acid, or whether by some secret of nature either of these forms is transmuted into the other before it serves the purpose of vegetable nutrition, is a question reserved for the future decision of agricultural chemists.*

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* See M. Payen's analysis in Sir R. Murchison's account of the Tchornoi Zem, Journal III. 132.

† "Nec fuit indignum superis bis sanguine nostro
Emathiam et latos Hæmi pinguescere campos."

"Emathia, Heaven decreed, was twice imbrued,
And Hæmus' fields twice fatten'd with our blood."

Georgics: WARTON.

Lucan also, in speaking of the same battle-field of Pharsalia, mentions the darker hue imparted to the young corn by past bloodshed, as well as the remains of fallen warriors turned up by the plough :—

"Quæ seges infectâ non surget decolor herbâ ?
Quo non Romanos violabis vomere Manes ?"—*Pharsalia*, VII.

‡ Dr. Hartstein, Director of the Prussian Agricultural College at Poppeldorf, in an able work he has just published on the 'Improvement of English and Scotch Farming,' argues earnestly for this previous conversion of nitric acid into ammonia. "This occurs," he says, "as follows :—The hydrogen liberated by the decomposition of organic substances, when it meets the nitric acid of saltpetre, not only withdraws from it oxygen, and so forms water, but, further, hydrogen in the *nascent* state combines with the nitrogen, forming ammonia, the food of plants. In thus explaining the beneficial action of saltpetre, we find

Singularly indeed, while we are discussing the question, it has been discovered at Paris that nature supplies to plants both forms of nourishment indifferently in every shower. Our English chemist Cavendish showed in 1781, that the electric flash *might* produce nitric acid in the atmosphere. Liebig has since ascertained the actual existence therein of ammonia. Monsieur Barral, having examined the rain-water collected at Paris last year and the year before, has found in every shower an amount of each substance, reaching in the course of a year the following quantities severally per English acre :†—

		Nitrogen.
	lbs.	lbs.
Ammonia	12·29 =	[illegible]·69
Nitric acid	41·24 =	10·12

Still this large amount of manuring substance might be derived by the atmosphere of Paris from the smoke and the fœtid exhalations which float

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no scientific contradiction. The transformation of nitric acid into ammonia by hydrogen, when this latter substance is liberated from combination, and comes simultaneously into contact with nitric acid, is a well-known fact."—*Fortschritte der Englischen und Schottischen Landwerthschaft*, von Dr. Edward Hartstein. Bonn. 1853.

* For a very instructive inquiry into the difficult subject of nitrification, see 'Experiences Chemiques et Agronomiques, par F. Kühlman. Paris, 1847.' This work also contains a series of experiments proving the nitrogenous hypothesis of manures ; and also a direct experiment establishing the action of nitrate of lime, which had not previously come to my knowledge.

† The figures of M. Barral are so corrected by Dr. Wilson.

above every great capital, and much doubt was accordingly felt by continental chemists on the whole result of the investigation. It seemed desirable, therefore, to repeat the experiment in pure country air. Accordingly rain-water was collected by me last October at this place, which is remote from any large town, except Oxford, from which the wind did not blow while the showers took place. It was analysed by Professor Way; and, supposing our annual fall of rain to be 28 inches, the amount of manure yearly poured down from the clouds on our soil would be larger than even at Paris. For it would stand thus :—

		Nitrogen.	Nitrate of Soda.	Guano without Phosphates.
	lbs.	lbs.	lbs.	lbs.
Ammonia	28·59	= 23·54	= $159\frac{3}{10}$	= 164
Nitric acid	68·91	= 17·88	= 121	= $124\frac{6}{10}$
Annual downfall of manure per acre		41·42	= $280\frac{3}{10}$	= $288\frac{6}{10}$

It appears that in a year of ordinary rain the skies give us ammonia and nitric acid equal to a full dressing of saltpetre or guano. Much of each, especially the ammonia, is lost, perhaps, by exhalation from the surface of plants or of the land after slight showers. Enough, however of both must remain to account for the luxuriant growth which sometimes seems to follow a thunderstorm, and also to illustrate the Psalmist's expression that the clouds drop fatness. This atmospheric distillation may also account for the permanent fertility of downs from which the sheep have for centuries been removed every night—in some degree for the benefit conferred by rest upon fallows—partially even for the remarkable repetition of wheat-crops at Lois Weedon, if we suppose that the constant stirrings practised by Mr. Smith enable the soil to absorb the pluvial nitrogen that might otherwise escape by evaporation. In any case, this large discharge of nitric acid as well as ammonia is rendered important by the direct evidence now attained for the action of that acid upon vegetation.

Nor will our better acquaintance with nitric acid be limited, I trust, to the theory of agriculture, or remain a dead letter, without effect on our practice, for we now know with certainty the efficacy of the nitrates. But one great chemical problem of agriculture is the prevention of waste in dung-making; yet the attempts to fix the ammonia of dung have not been very happy. While some methods have not fixed it at all, others have cost in fixing it more than the result, if attained, would be worth. The favourite proposal has been the formation of sulphate of ammonia, which, under *ordinary circumstances, is a fixed salt.* But an experiment made last spring *on this farm will show how little we can depend on the fixity so dearly obtained.*

A ten-acre piece of oats, looking last spring very badly, was dressed on one side with nitrate of soda, and with sulphate of ammonia upon the other side, a blank space being left in the middle. Since the nitrogen in the ammonia and in the nitrate were in the proportion of 20 and 15 respectively, I made no doubt that, as equal quantities, 6 stone of each per acre, were used, the ammonia would yield the bulkier crop. On the contrary, while the nitrate, though a moderate dose, gave an increase of 18 bushels per acre, forcing the straw, too, a foot higher, no difference at all could be seen between the yield of the unmanured and of the ammoniated land. This unaccountable result has been cleared up, however, by Dr. Voelcker, who informs me that sulphate of ammonia had equally failed on the Cirencester farm; that he had often remarked a pungent odour on the land where it was used, and has little doubt that this salt, however carefully fixed, had been decomposed again, and dissipated by the natural lime of the soil.*

On the other hand, great fault has been found with our ordinary mode of making dung by laying it up in heaps. It has been said that when first put together, these heaps show the presence of ammonia by the pungent smell that escapes from them, but that after a few months their scentless state proves them to have become little better than dead woody fibre. Still it was clear that this apparently inert matter, though it gave forth no odours, had a powerful effect upon the farmer's crops, and I have long suspected that dunghills might contain nitre. Mr. Nesbitt informs me that by chemical analysis he has repeatedly found nitrates in ripened dung. The alkali required might be furnished by the potash of the decayed straw. But he has also found, what is a very curious chemical fact, that whereas, for forming a salt, some alkali or other is required to combine with the acid, and whereas further, nitrogen, when liberated from decomposing matter, may become either nitric acid or ammonia, which is an alkali, *both* nitric acid and ammonia are in fact sometimes formed in fermenting manure at the same time, for the very purpose, as it were, of combination; for Mr. Nesbitt finds nitrate of ammonia† in dung-heaps. This is certainly a remarkable effort of nature to prevent waste of fertilizing materials, but a lesson which in our domestic arrangements we can hardly be said to obey.

Again, no farming practice has been more decidedly blamed than the west country method of mixing lime with the dunghill, because lime decomposes salts of ammonia. It was forgotten, however, that in fresh dung the ammonia

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* On other soils sulphate of ammonia has been found operative, but it is evidently not a manure which can be adopted anywhere without previous trial, to be used upon the *surface* of land.

† See Mr. Nesbitt's letter appended to this paper.

is not yet formed, while the undeveloped nitrogenous matter contained in the dung may be most effectually fixed by the lime—may become nitrified through the mixture, *exactly as in the French nitre-beds, by which saltpetre* was produced during the late war for the manufacture of gunpowder.* So cautious must we be in drawing chemical inferences for farmers without careful and direct experiment.

In compost heaps, too, nitrates are doubtless produced, and the suggestion of Mr. Nesbitt is well worth consideration, that in making our dung we should no longer aim at fixing ammonia, which eludes our grasp, but at forming nitrates, in accordance with the practice of husbandry and the explanations of science. Dr. Voelcker's opinions point the same way, and, in justice to him, his views ought to be presented as communicated to me for my own information.

" I am glad that you are advocating the use of nitrate of soda in agriculture, for I have long entertained the opinion that the functions of the nitrates, in relation to the nutrition of plants are of the highest importance, and that the more liberal application of nitrate of soda will be a great boon to the farmer.

" It appears to me that plants in general are *more dependent on nitric acid, as the source from which they derive their nitrogen, than upon ammonia*. Already, four years ago, I came to the conclusion that ready formed ammonia ought not to be applied to calcarious soils, and have recommended accordingly to bring the farmyard-manure on such land as fresh as possible ; and in artificials, to supply the place of the ammonia by *nitrates*.

" I have been led to this conclusion by the following theoretical reasonings, which I had occasion likewise to observe confirmed by local practice.

" Lime readily displaces ammonia from its salts, and being volatile, we can understand that much of the most essential fertilizing constituents of well fermented dung, will be lost when it is applied to a calcareous soil.

" If, on the contrary, organic nitrogenized matters are decomposed in contact with strong bases, such as lime or potash, the nitrogen they contain is converted into nitric acid, and not, as usual, into ammonia. *Fresh* dung, in which the greater part of the nitrogen which it contains is not yet changed into ammonia, as appears to me, should be employed on calcareous soils ; because it is highly probable that the lime in such soils will convert the nitrogen of the nitrogenized substances of the manure into nitric acid—a compound which in combination with bases, appears in many circumstances to exercise even a more powerful invigorating effect than ammonia itself. In confirmation of these views I have frequently observed that guano shows a much more marked effect on other soils than very calcareous ones. On our own farm I have frequently observed a very powerful smell of ammonia, especially in dry weather, in walking over fields which had been top-dressed with guano.

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* According to the prevalent opinion, caustic lime would decompose the urea contained in fresh manure, but Dr. Voelcker informs me that experiment leads him to an opposite conclusion.

"Some years ago we used sulphate of ammonia on several thin stony calcareous soils, and portions of the fields were left undressed, in order to observe any difference in the crop; but not any difference could be seen in the portions of the fields which were not manured with sulphate of ammonia. The smell of ammonia on the land on which sulphate of ammonia was employed, was very strong indeed, and I have little doubt that almost all the ammonia contained in the salt has been driven off by the lime in the soil, and that for this reason no effect in the appearance of the crop has been observed.

"That guano still exercises a very powerful action on calcareous soils need *not astonish us, for although a portion of nitrogen contained in it in the form of ammonia, is driven off when guano is employed on such* land: by far the greater quantity of nitrogen in guano exists in it as uric acid and other organic compounds, which, in contact with lime, will give rise to the formation of nitrates on their decomposition. Besides, guano contains phosphates and salts of potash."

Our acquaintance then with the main law of manures stands at present as follows:—The nitrogen of most manures is committed to the soil in a neutral state, capable therefore of uniting either with oxygen to become nitric acid or with hydrogen to become an alkali, ammonia. Some few manures contain ammonia ready formed, some other few nitric acid. It seems clear that the neutral nitrogenous matter is converted into ammonia or into nitric acid before it is absorbed by the plant. So that we have only two alternatives to consider, and not three. But it is uncertain as yet whether plants can feed indifferently on each of the two substances, or whether one of these is first transformed into the other; whether, that is, the acid is changed into the alkali, as Dr. Wilson deems possible and Dr. Hartstein asserts, or whether what appears a more easy transformation takes place, and ammonia is changed into nitric acid.

This scientific question between ammonia and nitric acid assumes indeed further a very practical commercial shape. For, as is well known, our main foreign supply of manure reaches us from the rainless side of South America, in rival cargoes of guano and cubic saltpetre, the former of which, as it happens, is ammoniacal, the other a nitrate. Now this rivality is most important, since the guano trade is a monopoly of the Peruvian Government; and, even were the trade open, there is a doubt how long it would last, for in that free republic, as we are told, Don Domingo Elias was sent to the gaol of Callao last summer for alleging that the supply of guano would be worn out in nine years.

This sensitiveness of the Peruvian rulers in itself raised suspicion; and authentic intelligence has just reached our own Government from the admiral in command on the coast of Peru, which renders the whole question of monopoly less important, inasmuch as, if Admiral Moresby's report be accurate, the entire trade may come to an early end from exhaustion of the material.

According to a semi-official statement of the Peruvian Government,* the total deposits of guano in their territory amounted nearly to 27,000,000 tons, which, at a yearly export of 200,000 tons, would last more than a century. It was apportioned as follows :—

Northern District, ...	854,000
Middle ditto, *(Chinchas Islands,)* ..	18,250,000
Southern ditto, ...	7,621,000
Total, ...	26,725,000

But Admiral Moresby states that the larger of these Spanish numbers is reduced by English survey (no unusual occurrence, by the way, in the Peninsular war) from 18,250,000 to 8,600,000 tons. Furthermore, it appears that, of this reduced quantity, only one-half is by its quality fitted for English consumption. This reduced amount is also now being exhausted more rapidly by an active demand from the United States; for the American ships loading at the Chinchas actually exceed the British in tonnage. In short, Admiral Moresby, in his official despatch, comes to the conclusion that, "at the present average rate of exportation, the islands would be exhausted of the guano that would pay freight, or be saleable in the English market, in *eight or nine years.*" It is true that the Admiral's survey has been limited to the middle district, the Chinchas Islands, and that, according, to the Peruvian Government, the Northern and Southern districts contain 8,000,000 tons of guano besides. But when we have made due allowance for the airy amplitude of Spanish arithmetic, and also a deduction for inferior *quality* from the gross *quantities* which English officers may find in existence, it is to be feared that those other districts may not add many years to our lease of this valuable manure. The prospect is formidable, since 150,000 tons of guano are now imported yearly, and nearly a million and a half sterling expended by spirited English and Scotch farmers, whose management is entirely dependent upon this foreign manure. We must now, therefore, look the difficulty in the face and prepare for the emergency. A fresh source of supply is of course desired, and our vessels are on the look-out for one; but the samples of new guano lately brought home have been found deficient in the essential ingredient nitrogen. One guano, indeed, met with, how extensively seems doubtful, in island caves of the Indian Archipelago and on the coast of Tenasserim, and produced not by seafowl but bats, does contain nitrogen, not indeed as ammonia, but as *saltpetre.* This *transmuted* guano, used successfully in the spice plantations of Penang contains a warning, as it were, that, instead of merely searching the seas, with whatever hope, for more guano, we should at once recognise the most valuable ingredient of guano, as it is found for the digging on the vast salt-plains of Tamarugal, at the foot of the Andes. The supply, too, of nitrate is likely to increase, not diminish, for, since attention was drawn in this Journal last winter to its manuring efficacy, an engineer has proceeded from England to construct a railway from the port of Iquique. It may be useful then to conclude this short notice by a comparison between guano and cubic saltpetre, as applicable and applied to particular crops ; and if any one imagines that guano belongs only to amateur farming, Mr. Stevenson will tell him, that in East Lothian* the money expended on portable manures may be taken at 12*s*. to 18*s*. per acre on the whole cultivated land of the county, that from 400*l*. to 600*l*. is a *common* yearly expenditure for guano on individual farms, and that, "the largest areable produce known to him is from land naturally very inferior, a cold retentive clay resting upon the coal formation,"—the worst of all subsoils—20*s*. per acre rent being paid to the landlord, but to the guano-merchant 46*s*. per acre, or *a thousand pounds yearly*.

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* Correspondence on the Guano Islands, presented to the House of Commons, May, 1852.

In comparing the two manures we must not, of course, forget that, besides nitrogen, guano contains phosphorus and potash. These ingredients, however, can be easily added to each ton of saltpetre, if wanted, at a cost of 1*l*. 13*s*. 9*d*. for phosphorus, and 14*s*. 8*d*. for potash; but the potash, I believe, would be rarely, and the phosphate not often, required.

Large as is the importation of guano, the crops to which it is applied are few, and the comparison of it with nitrate of soda as applied to those crops need not be tedious, for guano is used chiefly as follows :—First, as a top-dressing for grass ; next, drilled with wheat in autumn, or sprinkled over wheat as a top-dressing in spring ; lastly, for turnips.

The practice of top-dressing grass can hardly, indeed, be called a *practice* as yet. The careful experiment directed by H. R. H. Prince Albert to be made on the Windsor Farm, and recorded in this Journal,† while it proved that the use of *both* the leading nitrogenous manures is profitable upon grass, gave the advantage to guano. This advantage might have been accidentally due to the heavy rains which, prevailing at the time, may have washed down the nitrate below the roots of the grass. But information which has just reached me from an eminent Scotch farmer, Mr. Hope, of Fenton Barns, confirms the Windsor experiment. Mr. Hope's opinion derives great weight from the extent of his experience, for he occupies 660 acres, and states moreover that, *unless portable manures are applied at the rate of* 1*l*. *per acre over the whole farm, he cannot continue to farm at a profit*.‡ He writes to me thus :—

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* See Report on East Lothian in the present number, p. 304.

† Journal of Royal Agricultural Society, XIII. p. 347.

‡ See Mr. Stevenson's account of Mr. Hope's farm in the present number, p. 317.

"For many years I have been in the habit of applying nitrate as top-dressing for clover and rye-grass, to be cut as green food and for hay. I generally sow it broad-cast on the grass early in April. I have found that 180 lbs. per imp. acre was a fair allowance, but that it paid better, from a heavier crop being obtained at less expense, to give only 90 lbs. nitrate and 180 lbs. of Peruvian guano, *this being also better than double the quantity of guano by itself."*

This result of Mr. Hope's experience is intricate, but appears to show on the one hand that, on his particular soil, the nitrogen of the saltpetre requires to be aided by the phosphates, perhaps even by the potash contained in guano, and to prove on the other hand that a *small* dose of those salts is sufficient, while the superior *fixity* of the nitrogen contained in the nitrate compensated its greater *quantity* in the guano. For we know that in dry weather a total loss by surface exhalation has sometimes attended the use of guano; and as upon grass-land guano of course cannot be harrowed in, it would appear thriftier to use nitrate only, with the addition of superphosphate, and, if requisite, potash, for grass; we have striking evidence from Scotland for the profitable application of nitrate even *singly* to grass-land. Thus Mr. Main, of Mid-Lothian, in his Prize Essay,* tells us :—

"Top-dressing on grass, whether for hay, soiling, or pasture, is of immense advantage. A remarkable instance occurred in my own experience three years since. A field of 15 acres had been laid to permanent pasture some six years before. It is not naturally a grass soil, indeed the very reverse. For three years, however, it yielded well, and kept a large amount of stock. In the fourth it began to fail, the fifth was still worse, and in the sixth it may be said that 12 cows *starved* on it. In the seventh it was top-dressed with a ton of nitrate in April, and the results were astonishing. The stock pastured on it that year was 13 milk cows (2 with calves suckling), 5 stirks, 3 colts, and at intervals 60 sheep. I have continued to benefit by this experience. A large amount of roughness (rough grass) was left for wintering ewes, which I could not in the two previous winters fold in the same field."

On the average then of seasons, nitrate, aided by superphosphate if need be, appears preferable to guano for top-dressing grass, and in this application of it no risk can arise from over-luxuriant growth.

Not so in its use upon wheat, for which purpose a combination with salt can alone render it safe. But there are two modes of supplying wheat with pulverized manures—autumnal drilling and spring top-dressing. An experiment tried here this year throws some light upon both methods, and may be the more useful as involving the total failure of one.

The trial ground had been purposely exhausted by white crops for three previous years. Four different manures were drilled with the wheat in the

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* Transactions of the Highland Society, July, 1853, p. 16.

autumn ; one-half of each lot was dressed with nitrate and salt, at two dressings, in spring. The produce was threshed out on the field, separately, after harvest. Contrary to the experience of others, and to my own upon the same land, none of the drilled manures took any effect. The soil is a sandy loam, and they must all have been washed down by the unusual rains. But the spring dressing with nitrate took a singularly powerful effect, as the following table will show :—

Turns of the Drill.		Manure.	Yield on Undressed 2½ acres.	Yield on Top-dressed 2½ acres.	Increase by 2 cwts. Nitrate.
		Cwts.	Bushels.	Bushels.	Bushels.
10	Guano	3	6¼	13	..
10	Blood	3	6¾	12½	..
10	Rapedust ..	6	4½	11¾	..
10	Nitrate	3	5⅛	11¼	..
2	Nothing	0	1	2¾	..
Five acres.			23⅝	51¼	27⅝

It will be seen that the *natural* produce of this land is very low—only 9 bushels of wheat per acre, and that owing to the season the drilled manures were all but thrown away. The profit by the top-dressing of nitrate was, on the contrary, exceedingly high. On about 2½ acres of wheat, 2 cwt. of nitrate and 4 cwt. of salt, costing less than 2*l.*, gave about 3½ quarters of grain, which at 57*s.* sold for nearly 10*l.*—in exact figures 9*l.* 17*s.* Last year I ventured to say that if nitrate could be reduced in price by *one-half*, a large additional home supply of wheat might be grown at 12*s.* per quarter. This year, at the *same* price of nitrate, these extra 3½ quarters stood me in less than that sum. It is curious that poor land, producing merely 9 bushels per acre, was enabled by 90 lbs. of nitrate, costing with the salt 15*s.*, to grow 20 bushels per acre. So great an increase is however exceptional, nor would it be safe to take the average increase of wheat by the use of nitrate at more than 6 bushels per acre, but the poorer the land the greater will be found its efficacy.

Being satisfied as to the superiority of nitrate to guano *as a top-dressing*, I have made no further comparative trial, but have been fortunate enough to receive from the high authority of Mr. Hope the following decisive experiment carried out by him in the two last seasons :—

"I have only applied nitrate for two years to wheat, and that after seeing the account of your own experiment in Mr. Caird's English Agriculture. In April, 1852, I top-dressed wheat after potatoes ; the soil a dry gravelly loam. At the time the wheat was not very promising in appearance. I sowed on part 1 cwt. nitrate mixed with 1 cwt. salt per imp. acre ; on another portion 3 cwt. Peruvian guano was applied, and a part got nothing. The nitrate of soda soon took the lead, and kept it. A portion of each was threshed separately, when they were found to yield as follows; viz.—

Cwt.		Per Imp. Acre. *Straw.*	*Wheat.*
1	Nitrate of soda	37¾ cwts.	53 bushels.
3	Guano	36 „	49 „
	Nothing	33 „	39 „

"In 1853 I tried the same thing on wheat after beans; I never, however, could detect any difference with the eye except where the crop got nothing, though in the former year the difference between the two manures could be seen at a glance; and having cut the crop with a reaping-machine, which rather intermixed the lots, I was prevented threshing them separately. I have bought 5 tons nitrate for next year, and mean to apply a portion to potatoes."

Here it appears that *three* cwt. of guano, costing about 30s., were surpassed in 1852, and equalled in 1853, by *one* cwt. of saltpetre, costing with the salt but 18*s*. Indeed, guano is so liable to escape in dry weather upon a hot surface, that it cannot compete with nitrate as a top-dressing. For autumn sowing it is probably better than nitrate; but then the question arises, ought we on *light* soils* to use at that season either one or the other? When we consider how soon the growth of autumn-sown wheat comes to a stand-still to provide it with manure, in the hope that the food may remain safe for its use in the spring, seems at best a venturous precaution, like placing beneath an infant's pillow the cakes intended for its morning repast.

There remains only to be considered the application of guano to turnips, but here the comparison of the two manures is less easy, because a previous question arises, whether either one or the other should be applied to turnips at all, or whether in the culture of those roots we should not rather

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* On strong soils the case is different, as the following experiment made by Mr. Caird at Baldoon, in the same wet autumn of 1852, clearly shows. The result was as follows:—

Experiment with Guano on Wheat sown after Fallow on drained alluvial Clay, the Guano (Peruvian) harrowed in with the seed, 20th September, 1852.

	Cost per Acre.	Yield in Bushels.	Increase.	Grain after deducting cost of Manure. Wheat at 7*s*.
1. One acre without manure	..	35		
2. „ 2 cwt. guano ...	20	44		

rely upon bone-earth. From experience I have long done so on my own farm; there are on record experiments clearly showing that on some land superphosphate is not only cheaper than guano but more effectual, and as the consumption of guano for this purpose is very great, especially among the spirited farmers of East Lothian, it will be worth while to recall one or two of those experiments, and first a very striking one made by Mr. Drewett, near Arundel:*—

Purchased manure.	Weight of Turnips, per acre. Tons	Cwts.
None	5	18
3½ cwt. Peruvian guano	9	2
3½ cwt. African guano	13	1
Superphosphate from 6 bushels *calcined* bones	17	10

It is observable here that not only has the superphosphate excelled the guano, but the cheap African has surpassed the dear Peruvian guano, because it contains less nitrogen indeed, but more of the phosphates. Mr. Caird also states that the inferior and cheaper Bolivian guano is better for turnips than the Peruvian, the ground of that superiority of course being the same, the excess of phosphates in a given weight of Bolivian guano.

Mr. Lawes even found that where he had supplied his turnips with superphosphate all the nitrogenous manures he could add to that manure produced no increase in his crop.

Nitrogenous Manures added.	Mean produce of Turnips per acre. Tons.	Cwts.
Phosphates, &c.	12	8
„ with 10 cwts. of rape-cake	13	4
„ with 3 cwts. sulph. ammonia	12	5
„ with 10 cwts. rape-cake, and 3 cwts. ammonia	12	4

Still, though both experience and experiment in the South of England are in favour of giving phosphorus only to turnips, and of reserving nitrogen for the corn crop, it would be rash to assert that our northern farmers are wrong when they use guano, and deference is due to their experience also. We find indeed, that ammonia sometimes thins the plants, and that it produces the growth of leaf rather than bulb. Possibly from our necessarily late season of sowing, that excess of leaf has not *time* to mature the weight of bulb, while the cooler skies of the north allow it to ripen by permitting an earlier sowing. Be that as it may, I thought it right to try nitrate upon turnips this year, in order to ascertain whether, in case of need, it might become a substitute for guano with this crop also. Guano itself, however, was not used in the comparison because that being a compound substance, the experiment would have been more complicated. All that I wanted to know was whether the nitric acid of the salt would act upon root-crops like the ammonia of the birds'-dung, since if this were so, the other constituents of guano might be easily added. The nitrate and the ammonia* were applied in equal quantities, and they acted exactly alike; so much so, indeed, that, though very small doses of each were applied through the water-drill, they both seemed equally to have killed all the seed. However some stragglers came up, sufficient to fill the rows, which grew very slowly at first, but became luxuriant afterwards, and certainly would have gained bulk for another month if they had not been stopped by a November frost. No difference could be seen in the action of the two manures, and the test of weighing showed their effect to have been nearly identical.

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* Journal, Vol. I. p. 582. Each lot received also 20 bushels of dung, and 200 to 250 bushels of turf-ashes.

	Swedes per Acre.	
	Tons.	cwts.
No manure	16	8
Nitrate, 160 lbs.	20	8
Ammonia sulph., ditto.	20	1

The result of the whole comparison appears to be this. For grass-land, saltpetre is equal to guano if a small quantity of phosphates and perhaps of potash be added. For wheat it is probably inferior to guano if applied in autumn, because more liable to be washed down by rain, but preferable if used in spring, because less liable to evaporation in drought, and spring is apparently the best season for giving purchased manures to wheat. For turnips superphosphate is superior generally to either guano or nitrate, and has the great advantage over both, that it can be used with the water-drill, and that, being so used, it gives us in the south a rapid growth which makes up for our late seed-time; but if nitrogenous matter be also required, we now know that nitrate can be spread broad-cast over turnip-land as successfully as guano itself. We have therefore found a substitute for guano in the three great departments of husbandry, the culture of grass, of roots, and of corn.

The comparison of nitrate with guano is even more important this year than it was a twelvemonth ago. Then our object was to lower the price of guano by bringing into competition with it another article not sold under monopoly. Now, the recent survey of the Chincha islands shows that we have to fear a rise in the price of guano preceding a total cessation of the supply. The possession, therefore, of an equivalent is more desirable, and now that we have found that equivalent, the increased supply of cubic saltpetre is more urgent, and to that point the enterprise of our merchants must next be directed. This salt we know occupies the surface of a plain 150 miles long, the Pampa of Tamarugal, separated by only 10 miles from the Pacific. Unfortunately, however, those ten miles wear so rugged a surface, that although a railway is being constructed from the port of Iquique, to a height of 3000 feet inland, it cannot be continued to the refinery; so that the coals for refining the salt, and the salt when refined, must still be carried on the backs of mules to and from these southern Salitres. But to the north of Iquique is the mouth of the river Pisagua, which skirts the Pampa not very far from the northern Salitres, affording of course a level line for a railway in the direction required. On the south, again, the river Loa offers the same facilities, passing near some newly-discovered nitrate beds. All these sources, however, have unfortunately one common defect—they are subject to the same government which owns the guano islands, the government of Peru. But Mr. Bollaert, our main authority, informs us that nitrate is also found higher up the river Loa in the desert of Atacama, which belongs, I believe, to the rival government of Bolivia. It is further stated, though in a less authentic manner, that saltpetre plains exist to the west of St. Luis de Potosi, in Southern Mexico, with water communication to the Atlantic. In all those remote regions inquiry has been set on foot through the resident consuls by Lord Clarendon, and their answers will be communicated to our Society; but in the meanwhile the Liverpool merchants, who have been naturally eager to share in the guano trade, should not neglect to make exertions of their own in these more promising fields. Whether they fetch us guano or nitrate, we are now assured that they supply our land with the same manure, differing indeed in name and in form, but identical in substance and virtue. Such is the solid result established by chemistry, and thus I hope to have made good what I ventured to assert in the outset, that abstract investigation may sometimes serve to guide us safely amid practical difficulties.

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* The sulphate of ammonia was used, and was well mixed with the soil, so that there was no risk of its escape by evaporation.

PUSEY, *Dec.*, 1853.

N. B.—The amount of Nitric Acid and Ammonia contained in rain must be regarded as open to future observation and correction.

APPENDIX.

To Mr. Pusey.

Dear Sir,—At your request I subjoin a few observations on the conditions required for the formation of nitrates; much regretting that, in consequence of the approaching publication of the Journal, I have not time to present the subject before you in a more perfect manner.

For some years, in my lectures, I have endeavoured to direct the attention of the farmer to the artificial formation of nitre, having felt somewhat surprised that its importance has hitherto been so generally overlooked.

I shall at present content myself with a brief explanation of the condition, under which nitrates are formed. Whenever animal or vegetable matter gaseous, liquid, or solid, containing nitrogen, comes into contact with *mild* calcareous or alkaline earths, the mixture being moist, and so porous that the air can easily penetrate, after some time the nitrogen, under certain conditions of temperature, is acted upon by the atmosphere, is oxidized, and is converted into nitric acid, which at once unites with the calcareous or alkaline bases present in the mixture.

The temperature most suitable is from 58° to 68° Fahr., and the action ceases at 32° Fahr., the freezing point.

The instances of the oxidation of gaseous nitrogenous bodies are very common. The mortar of almost all old buildings, in any situation, contains a greater or less amount of *nitrate of lime*, the nitric acid of which is produced by the oxidation of ammonia, absorbed by the mortar from the atmosphere. Another example is that furnished by an experiment of a French philosopher, who suspended a piece of moistened and well-washed chalk over a basin of putrifying blood, and who, after the lapse of some time, detected easily the presence of nitric acid in the chalk.

The oxidation of liquid nitrogenous compounds is also of ordinary occurrence. The urine of any animal mixed with calcareous or earthy matter readily furnishes nitrates by oxidation; and even the urinary deposits of animals on pastures in summer give rise to the formation of nitrates. The walls of stables and cowhouses, which by absorption have been moistened with urine, often give on their surfaces efflorescences of nitre.

The conversion into nitric acid of the nitrogen of solid animal or vegetable matters constantly occurs when these bodies are in contact with earthy calcareous matters. Even in the absence of calcareous substances nitric acid is formed in such common dung-heaps as consist merely of decomposing animal and vegetable matter; for one part of the ammonia produced by ordinary decomposition acts as the alkaline base to another portion, which by oxidation is converted into nitric acid. Nitrate of ammonia may always be found in dung-heaps. Nitrates are also present in all shallow wells adjacent to *church-yards,* and in those which derive their liquid supplies from strata into which cesspools empty themselves.

The proper conditions for the formation of nitrates are always to be found in well-drained and well-manured fields, particularly when they contain calcareous matter. One of the great uses of liming is to furnish the alkaline matter where it is deficient. In our laboratories we have examined a great number of soils, and in almost every instance have detected the presence of nitre.

In my opinion, a proper knowledge of the mode of forming nitre beds would be of considerable importance to the farmer; for by their use not only would he be able to conserve the ammonia of his manure when he had more of the latter than he could at once apply to the land, but by using the liquid manure from the tanks the necessary moisture would be given to the heap; and whilst the aqueous particles, so expensive to carry, would gradually evaporate, the valuable matters of the liquid would be retained in the compost.

The mode of making artificial nitre-beds has been shortly described in my lecture to which you refer. It is exceedingly simple. A layer of calcareous matter forms the base of the heap, and layers of horse-dung, cow-dung, carrion, or other similar matters alternating with layers of marl, mortar, or *spent* lime, will constitute the nitre-bed. The mixture should always be kept moist with urine, or urine and water; but too much water, as from rain, would be injurious, and the heap ought therefore to be kept under cover. The compost should lie as loosely as possible together, that the air may be easily able to permeate the mass. The heap should be thoroughly incorporated, and lightly turned over once in two or three months. In from six to nine months it will be ready for the farmer's use. *Quick lime* ought not to be used in making nitre beds, as its first and most powerful action is to drive off the ammonia from the manure.

It must be understood that, by making mixtures calculated to give rise to the artificial production of nitrates, we have a means of preventing the loss of ammonia which takes place in a common dung-heap; and that, under ordinary circumstances, manures containing either nitrates or ammonia, without any important amount of other substances, are valuable exactly in proportion to the amount of nitrogen they contain. It may be necessary to mention that in soils and dung-heaps the nitric acid produced by oxidation of ammonia *is reconverted* into ammonia when putrefaction is taking place and *access of air is prevented.*

In conclusion, I may mention that I have analysed a portion of a large nitre-bed of about 40 tons, which was (about ten months since) made on the premises attached to the College at Kennington. Though the heap has been exposed to all the rains of the season, it was found that one pound weight of the compost contained 21 grains of nitric acid, which is equivalent to 34 grains of saltpetre. This is an amount much below what we should have found had we had the heap under cover.

I am, &c.,
J. C. Nesbit.

College of Agriculture and Chemistry,
Kennington, Dec. 13, 1853.

On the Rheea Fibres of Assam and the Hemp of the Himalayas.

Rheea fibre, value of.

The Rheea fibre forwarded by the Government of India, as the produce of Assam, in order that its properties and value may be correctly ascertained in this country, appears to me likely to prove one of the most valuable products of India, for in strength it exceeds the best Hemp, and in fineness it rivals the superior kinds of Flax. Its culture is well known to the natives of Assam, and in the districts of Rungpore and of Dinagepore, being their *Kunkhoora*. It is known in Burmah, and is the *Pan* of the Shans, the *Ramee* of the Malays and of Java, and the *Caloee* of Sumatra. Its culture succeeded in Tenasserim, and is practised in Siam, as in other Eastern countries and islands. It can now be produced and sold with profit at as cheap a rate as Russian Hemp, and if any machine could be employed for facilitating the separation of the fibre from the outer bark and the woody part of the stalks, it would speedily undersell all other fibres, as from four to five crops of fibre can be obtained within the year from the same plants.

Identity of Rheea with Chú-ma or China Grass.

By Botanists.

The Rheea fibre, though a new import from Assam, is well known under another name, being identical with the highly valued article of commerce, known by the name of *China Grass*, the Chú-má of the Chinese, and from which the famed grass-cloth of China is manufactured. The proof of this identity is very complete. One of the educated Chinese introduced into Upper Assam, on account of the tea manufactory there, recognized the *Rheea* as identical with the *Chú-má* of his own country. The Rheea of Assam had been ascertained by Botanists to be the same plant as the *Urtica tenacissima* of Dr. Roxburgh, who, half a century ago, was informed by a friend at Canton, that the plant which he had obtained from Bencoolen, as the *Caloee* of Sumatra, and to which he gave the above botanical name, was that from which the Chinese Grass-cloth was made. Lately Dr. MacGowan settled at Ningpo, sent specimens of the *Chú-má* to Calcutta.* These Dr. Falconer found to be the same plant as the *Boehmeria nivea* of

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* These were sent on the requisition of the Agricultural and Horticultural Society of India. (See Journ. Vol. VII. p. 18.) The Society took up the subject most earnestly in 1845, and did not rest till they had ascertained, beyond a doubt, the identity of the "Rheea" of Assam, with the "China grass" plant.—Eds. *Journ. A. and H. Society of India.*

By Manufacturers.

Botanists, described under the name of *Urtica tenacissima* by Dr. Roxburgh. Sir W. Hooker had also identified these two plants as being identical, and has described the former as yielding what is called *China Grass*. Further, manufacturers in this country have found the two fibres to be the same for all practical purposes.

Culture.

In Assam, Rungpore, and Dinagepore, this plant seems to be very generally cultivated, though only in small quantities, by the dooms or fishermen, near their huts. Manure is useful, moisture essential for quick growth, as well as shade, and some protection from storms, in order to allow it to grow to the height of eight feet, from which a six feet fibre may be separated. Hence it is most common, and succeeds best in the districts along the foot of the hills. It is grown from the separated roots, and may be cut down several times in the year, so that four or five crops may easily be obtained during the year, and the aggregate produce of an acre of ground be about twelve maunds. The different crops vary in strength and fineness, the earlier being the stronger, and the later finer. The officers of the above districts, as well as others, state that the culture is perfectly understood, and that it is susceptible of easy and rapid extension, if the cultivators had any other inducement than their own requirements to grow it. The expense seems to be about 5 rupees a maund. For Major Hannay, referring to the fact of £20 a ton having been offered for any quantity in Calcutta, observes that "as it costs at least 5 rupees per maund, you will see that it can scarce be sent to Calcutta at the price offered." But he also says, that "if any cheaper method of separation from the stalk could be discovered, it would undersell all other fibres."

Various attempts to introduce it into commerce.

1803.

1811.

1814.

Various attempts have been made to make this fibre more generally known, and to bring it into demand as an article of commerce. Thus Dr. Roxburgh having obtained four plants from Bencoolen in the year 1803, wrote that "some thousand plants have been reared from these four, so readily does it grow and multiply;" and also, that it was one of the strongest fibres he had met with. In the year 1811, Dr. Buchanan sent three bales of the fibres from the Botanic Garden at Calcutta to the Court. These were sent to Messrs. Sharp, of Mark Lane, who reported that a thread spun of this fibre bore 252 lbs., whereas the weight required to be borne by Russian Hemp of the same size, in His Majesty's Dock Yards, was only 84 lbs. The Society of Arts, in the year 1814, awarded a medal to Captain J. Cotton, of the East India Company's Service, for the introduction of this fibre. It has frequently been sent by Colonel Jenkins and the officers employed in Assam to the Agri-Horticultural Society of Calcutta, in whose transactions several accounts of it have been published. Mr. Henley, late of Calcutta, informs me, that he readily collected two tons of it in the

North-west of Yunan, and by the Singpoos and Dhounneas of our own North-east frontier, to a small extent only, for a coarse cloth, but chiefly for nets. It is recognized by the Nepalese as the Leepceah of Nepal." Captain A. Thompson, of the firm of Thompson and Co., Rope Makers, of Calcutta, says of it, that "it is all that can be desired for either canvas or lines, and only requires to be known to be generally used for that purpose."* It has been valued as being worth about £35 a ton in this country, when made into a five-inch rope at Messrs. Huddart's works, it absorbed 1-7 of tar, and did not break until it bore nearly 9 tons weight.

Opinion of Captain Thompson.

There are several other fibres, some probably of equal value, to be found in abundance along the hills from Assam to near the Sutlej, as for instance, the† Pooah fibre yielded by *Boehmeria frutescens* and others, but I notice particularly only the two which have been now sent in sufficient quantity to have their properties satisfactorily ascertained.

Other Fibres.

In the accompanying Memorandum, the‡ strength of some of these fibres in the plain untwisted state, has been ascertained with samples of the same length and weight. By this it will be seen, that the Rheea fibres bore very heavy weights in their untwisted state, and that three others are at least equal to Russian Hemp, and the Kote Kangra Hemp far stronger than any thing that has yet been tried. It is at the same time liked for its colour and texture, and would be certain to be employed for all the purposes for which the best Hemp is required, if it could be procured. It is therefore included with the two Rheeas in the present recommendation. The Jubbulpore Hemp is being extensively cultivated by Mr. Williams, and already established as an article of commerce in India, and highly esteemed by good judges in this country.§

Their Strength.

The Wukka Nar might be exported from Travancore, and the Mŭddár or Yercum fibre from different parts of India,

Having ascertained, in a satisfactory manner, that the fibres in question are possessed of the requisite degree of strength, and the Rheea fibre of fineness in addition, the next point to determine is, how to make their good qualities so known in

Best mode of making them known in English Markets.

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* See *Journal* A. and H. Society of India, Vol. VI, p. 184.—Eds.

† See an account of this fibre in *Journ.* A. and H. Society of India, Vol. VI, pp. 135 and 240. —Eds.

‡ See Table at end of paper.

§ In a letter dated April, 1855, to the address of the Secretary A, and H.Society of India, Mr. Williams states that the price he obtained for this Hemp in England was £28 per ton, which, sum scarcely covered his expences: and he observes, "as I get a more remunerative price, for all I can grow, from the rope-makers in Calcutta, it is not my intention of shipping any more till the cultivation has been greatly extended in these Territories, which of course, will be the work of years, as I have no one but the Hill tribes (the Gonds) to carry on the cultivation."—Eds.

the market, that if sent for sale, they may not be condemned as new things, and pronounced of "no value." I am informed by the best judges, that having taken the best means to determine the real value of these fibres, they must next be sent into the market for three or four years, and in sufficient quantities, to attract the notice of respectable manufacturers, and induce them to give these fibres a fair trial. For this purpose, I am told, that from ten to twenty tons sent annually into the market, for three or four years, would be sufficient: others say that this quantity should be sent twice a year. But in the case of India, such quantities being sent from different districts would arrive at different times, and have the same effect. The time, it may be observed, is extremely favorable for such an experiment, from the high price of Russian Hemp. This I am told will not come down to its ordinary price for two years, if the supply of money from this country is stopped for even this season.

Ten or twenty tons to be sent to market for three or four years.

The next difficulty is to induce the Natives of the districts containing these valuable fibres to extend their ordinary cultivation of the Rheea or of the Hemp, or to collect the Wild Rheea in increased quantities, and to prepare them all as carefully as possible for the English market The Officiating Commissioner of Revenue in Assam, recommends that as the culture of the Rheea fibre is sufficiently well understood, "the best way to encourage its extension would be to secure to the ryots a sure market at remunerating prices." Captain Dalton, Collector of Debrooghur, states "that the best method would be for Government to offer a premium of so much a ton on all that is produced for three or four years." Both recommendations might be united in one, if the officers who take so zealous an interest in the improvement of their districts, were authorized to purchase, (unless they find individuals willing to do so,) from ten to twenty tons of these fibres in their respective districts, and perhaps in some cases awarding small prizes, or some kind of khelah, as is done in Scinde.

Inducement for Natives to cultivate.

In issuing directions, as well as in making purchases, great care should be taken that the fibres were carefully and cleanly prepared, and if intended for rope-making, and as a substitute for Hemp, the Bon or Wild Rheea should be made to resemble as closely as possible the specimens of Petersburgh Hemp, which Mr. W. Cotton has been good enough to send for transmission to India. The improved appearance of the Rheea fibre sent by Major Hannay is owing to specimens sent out to him by Mr. W. Sangster; others cannot do better than follow Major Hannay's example, as there is every probability of establishing the best specimens of the Rheea fibre as a substitute for China Grass, when much higher prices would be realized than as a substitute for Hemp only. I would include in this direction for the purchase of Rheea and of Wild Rheea fibre in Assam, also the districts of Rungpore and of Dinagepore, for the Rheea fibre, where this fibre, as stated, is cultivated under the name of *Kunkhoora*, and where

Fibres to be carefully prepared.

Mr. Henley informs me, it might very easily be collected, and its culture extended.

The true Hemp cultivated in the Himalayas.

The Himalayan districts of Kemaon, Garhwal, and of Kote Kangra, abounding as they do in true Hemp of the finest quality, might also be encouraged to extend the culture of this plant, which they already cultivate, both on account of its fibre and for the different preparations of Bhang. The fibre is sold among themselves for 2 rupees for 82lbs., or about 5*s.* a cwt. The late Lord Auckland, when Governor-General of India, calculated that at the native rates it might be landed in Calcutta for £7-16 a ton, and Hempseed for £6 a ton.* But as it is doubtful whether the natives would be induced to increase the cultivation for the prices at which they sell the Hemp among themselves, it is necessary to notice the extent of the advance which it may be necessary to make in order to produce this effect.

The true Hemp.

Major Corbett says, that when Mr. Rutherford formerly purchased Hemp, that is, probably before the year 1812, it was deliverable at Chilkcea at 4 rupees a maund, at which price he thinks it could be procured (in 1841); and he states that if the culture were to be revived, "it would be cheaper and more satisfactory to the cultivators to have the advances made direct into their hands." He gives three estimates of the price, including all expenses, at which Hemp could be delivered in Calcutta from Kotedwara, Chilkea, and Sunnea, the average of which is £15-2 a ton.† Captain Kirke, giving 5 rupees a maund for the Hemp at Deyra Dhoon, calculated that it could be delivered for about £17-14 a ton.‡

Cost, delivered in Calcutta.

Preparation of Fibre.

In making advances for cultivating Hemp, it is absolutely necessary to call the attention of the Natives, not only to the culture, but to the preparation of the Hemp. The culture seems to be very well understood in many parts of the Hills, as they carefully prepare and usually manure the ground, thin the plants to within three or five inches, and cut the male plants, "*phoolbhunga*, which flowers but has no seed," a month or six weeks before the female plant, "*goolanga* or *ghoolbhunga*," which has seed, the latter being cut about the end of September. As the preparation is also understood, the cultivators should be required to do this in their best way, so as to produce a clean and uniform article in long lengths, without twisting or platting the ends up in any way, and to resemble the Petersburgh Hemp, of which specimens are sent, as nearly as possible.

Kote Kangra Hemp.

The Hemp sent by D. F. Macleod, Esq., as the produce of Kote Kangra, having been highly approved of in this country, would no doubt sell well if sent to market. It is desirable therefore to send a sufficient quantity to have its properties more extensively tested, and its value established in the English market.

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* See *Journ. A. and H. Society of India*, Vol. I, p. 41, where will be found several useful and interesting particulars on the subject.—Eds.

† See *Transactions A. and H. Society of India*, Vol. VIII, p. 278.—Eds.

‡ *Journ.* Vol. I, p. 43.—Eds.

Though it will no doubt be necessary in some cases to increase the original price of these fibres, as in the case of the Hemp, or perhaps of the Rheea, **for a time, so that when more extensively cultivated its cost shall have been ascertained, it is to be carefully kept in view, that any great increase of price in the articles will prevent their becoming permanently established as articles of commerce, as that would interfere with the profits of all those engaged in the transaction. Though the price of all fibres is at present high, it is uncertain how long this may continue, but it may be safely assumed, that if care be taken to make their superior quality known to proper Hemp brokers, that all which have been mentioned will come into competition with the best kinds of Hemp, and sell for about £35 a ton.**

The best Rheea fibre, if well prepared, ought to bring a higher price.

EAST INDIA HOUSE: (Signed) J. FORBES ROYLE, *M.D.*
13*th Feb.*, 1854.

Fibres tested at the Military Stores.	*lbs.*
Petersburgh Clean Hemp, ...	160
Jubbulpore Hemp, ...	190
China Grass, ...	250
Rheea Fibre, ...	320
Wild Rheea, ...	343
Kote Kangra Hemp, (no breakage at)	400
Wuckoo-nar Fibre, ...	175
Yercum or Ak or Mudar Fibre	190

Clean samples of all the above fibres were taken of equal weights, and firmly tied at their ends, so as to be of equal lengths at the India House, and their strength tried in the usual way by Mr. Hull, in the Military Stores, 16th December, 1853.

Experiments at Messrs. Huddart and Co's. Rope Manufactory, Limehouse, 13th February, 1854. Experiments on strength of Rope made from Samples of Rheea and Bon Rheea Fibre from Assam, received from the East India House.

Description of Hemp.	Size of Rope.	No. of Yarns per Strand.	Total No of Yarns in Rope.	Strength of Rope in Pounds.	Strength of Rope per inch Circumference squared.	Size of Rope at breaking.	Tar absorbed,	Amount of stretching.
	In.							
Wild Rheea, 1st Experiment, ...	4 7/8	44	132	19032	*844	4 5/8	1-7th	1 in 16
Ditto 2nd ditto, ..	4 7/8	44	132	20124	*894	4 5/8	1-7th	1 in 16
Rheea Fibre, ...	4 7/8	44	132	20488	*910	4 5/8	1-9th	1 in 16

* The average strength of Rope made with the best Hemp, and after numerous experiments, from 1803 to 1808, is 805.

The Preparation of the Rheea Fibre.

The preparation of the fibres is tedious, and is what causes the difficulty of sending the fibre at a cheaper rate into market. Major Hannay writes, "When the stalks have become brown for about six weeks above the roots, the top is seized with the left hand, and the leaves are stripped off by passing the right hand to the ground, near which the stalk is cut. The outer bark has first to be scraped off with a blunt-edged knife, when the exposed fibre still attached to the woody part of the stalk is exposed to the hot sun to dry. On the third morning, after being exposed to the dew for several hours, the fibre is drawn off. This is done by breaking (beating) the woody stalk right through towards the thicker end, and then separating the fibre therefrom, drawing it off slowly towards the small end, and repeating the process as often as necessary, though much of the fibre remains, and may be taken off at a second breaking." (The fibres now require to be carefully washed, *Henley*.) "The hanks of fibre are then separately twisted at the upper end and tied up in bundles. When the threads are required for spinning, they are prepared by drawing the single hanks several times with a blunt-edged slip of bamboo held in the right hand, when they are easily opened out to the required fineness with the fingers and thumb nails. This is certainly a rude and tedious process." Hannay says that "the Indo-Chinese method of separating the fibre is the quickest, the least expensive, and one which occasions little loss in the operation." Dr. MacGowan, of Ningpo, states that "in China the last cutting is made in September, from which the finest cloth is made, the first being inferior, coarse and hard. On being cut, the leaves are carefully taken off on the spot; the stalks taken to the house and soaked in water for an hour. In cold weather the water should be tepid. After this the plant is broken in the middle, by which the fibrous portion is loosened and raised from the stalk. Into the interstice thus made, the operator thrusts the finger nails and separates the fibre from the centre to one extremity and then to the other. The stripping process is very easy. The next process is scraping the Hemp, to facilitate which the fibre is first soaked in water. The strips of Hemp are drawn over the blade of a small knife or scraper from within outwards, and being pressed upon by the thumb, the fibrous portion of one surface, and the mucilaginous part of the other, are thus taken off. The Hemp is then wiped dry, and the whitest selected for fine cloth. It is afterwards bleached."*

The directions for peeling the Chú-má in China are given as follows, as translated from the Chinese:

Peeling the Fibres of the Tchou-ma.

When the stems are all got in, they are split longitudinally with knives of iron or of bamboo. The bark is first removed, then the lower layer (which is white, and covered with a shrivelled pellicle, which comes off by itself) is scraped off with a knife. The interior fibres are then seen; they are to be removed and softened in boiling water. If the *Tchou-ma* be peeled in winter, the stems must be previously steeped in tepid water, in order that they may be the more easily split.

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* See *Journal A. and H. Society of India*, Vol. VI. p. 214.—Eds

The first layer of *Tchou-ma* is coarse and hard, and is only good for making common materials; the second is a little more supple and fine; the third which is the best, is used for making extremely fine light articles.

Introduction of Bombyx Cynthia into Malta and Italy.

[The *Bombyx Cynthia*, or *Phalæna Cynthia*, is the *Eria* of Assam and the Eastern districts of Bengal. It has engaged the attention of the Agricultural and Horticultural Society of India for many years, and several notices of it are recorded in their *Transactions.* With the view of promoting the discovery of an efficient method of bringing the substance prepared by this worm into use as an article of commercial value, the Society, in conjunction with Capt , (now Col.) Jerkins, the Commissioner of Assam, offered in 1839, the sum of £ 60 and a gold medal to the discoverer of an effectual and cheap solvent for the adhesive material which attaches to the cocoon. Though this prize was before the public for upwards of seven years, no claimant for it appeared, and the amount was diverted to another purpose. It is gratifying to learn from the following extract, that the attempt to unwind the silk from the cocoon has proved so successful.—*Eds. Journ . Agr. &. Hort. Society of India.*]

Mr. Westwood exhibited a sample of the silk produced at Malta from cocoons of *Bombyx Cynthia*, which sample was given by the Governor, Sir William Reid, to Dr. Templeton, and by him forwarded to Mr. Westwood with the following letter:—

"*Valetta, 10th November*, 1855,

"MY DEAR WESTWOOD,—I take advantage of the Governor's kind offer to send you the enclosed silk, unwound, from the Cynthia cocoons by Signor Lotteri, an Italian, skilled in silk-winding, who declared that his fingers stuck together for a very long time afterwards, so gummy and resiny was the binding matrix of the silk. The result seems very fine, and is, I believe, very strong, in comparision with silks of similar thickness. At Casal Zebbourg, a gentleman introduced from the Governor's gardens some of the worms, got little boys to tear the cocoons to pieces, and native women to spin it, and there is now hanging, in the window of Mr. Goodenough's shop, a pair of stockings, and some lace-work made from the spun silk. The stockings have a muddy look, the colour of the enclosed, but in other respects appear fine substantial affairs, such as country people would be glad to get; and I believe they are everlasting. The great business is to get a machine to tear the cocoons to pieces, and that will soon follow, I presume. They have got the worm now into Tripoli in a fine healthy state; and planting castor-oil plant is now the order of the day every where.

"I trust the packet of live cocoons arrived safe, which were sent to you by the Governor's directions, per last mail. His Excellency was much pleased by the note in the *Athenæum* respecting them.

"Very truly yours,
(Signed,) R. TEMPLETON."

Mr. Westwood added that he had received the cocoons referred to, and found that some at least of the pupæ inclosed were alive, notwithstanding the long journey, and the change of temperature to which they had been subjected.

The Secretary read, from the *Journal of the Society of Arts*, November 10, the following extract from a despatch forwarded by Governor Sir William Reid to his Grace the Duke of Newcastle: —

"We have here in Malta gone through all the operations as practised in Assam, except weaving the silk thread into cloth. For this we have not yet a sufficient quantity; but the worms are breeding here faster than we can rear the castor-oil plant, they are now (in October) thriving in the open air, and as they consume the leaves of the castor-oil, they travel from plant to plant, feeding upon several, but apparently doing well only on the *Ricinus*.

"The French Government have applied, through their Consul, for a larger quantity of eggs, both for France and Algeria, and I have been enabled to supply him with as many as he requires.

"In consequence of statements published in the *Journal of the Society of Arts*, I have had an application from the Agricultural and Horticultural Society of Grenada, in the West Indies, for eggs of this silkworm. Some fresh cocoons will be sent from hence to Grenada, and I am not without hope, from the way in which they are being conveyed, and with the assistance of the Directors of the Royal Mail Steam Company, that eggs in a sound state will reach the West Indies."

The Secretary also read the following extract from the *Turin Gazette*, inclosed in the above-mentioned despatch: —

"*Culture of Silk in Piedmont.*—Sig. Vincenzo Griseri the first person who has undertaken the rearing of the *Bombyx Cynthia* worm upon leaves of the castor-oil plant, and the first who introduced it into France, has now terminated his second experiment of rearing the said worms. Sig. Griseri, conceiving the great service that these valuable insects might render in the production of silk, diligently distributed them to the various provinces of the state, as also in Brianza, and has received from all quarters accounts of a successful result. He succeeded last spring in rearing these worms even upon the castor-oil plants, while in the ground, and in the open air, in the garden of the Chemical Laboratory, under the observation of Chevalier Cantu, Director of that establishment, the Minister, Conte de Cavour, His Excellency the Duke of Guiche, Minister Plenipotentiary of France, Professors Abbenne and Borsarelli, and many other distinguished personages. From this mode of treatment, Signor Griseri discovered that these worms do not suffer from a low temperature, nor from strong winds, nor from continued rain; but, on the contrary, he obtained finer and better formed cocoons than those produced by the ordinary method, all which circumstances have been submitted to the Royal Academy.

After the first experiment he published, through the printers Chirio and Mina, the mode of bringing up these worms. In the second experiment he also fully succeeded, and found that the cocoons were superior to those brought from Calcutta and Malta, on which account he came to the conclusion that this new silkworm, a native of Bengal, has found its own climate in our country. An experiment is now being made as to the mode of extracting the silk, which has been confided to the care of able throwsters, and from some samples already produced it results that this silk is finer and more elastic than our common silk; further, two more important facts have just been communicated by Sig. Griseri, namely, that he has succeeded in feeding these worms exclusively upon willow leaves and lettuce leaves, and has obtained cocoons similar to those produced from the leaves of the castor-oil plant. During the experiments, Sig. Griseri, was assisted by the Countess Marianna Antonini, an experienced producer of silk, and Sig. Francesco Comba, a distinguished naturalist, who kindly offered him their aid and advice. Sig. Griseri intends next spring to try the rearing of our native grubs, the *Pavonia major*, and the *Pavonia minor*, which feed upon various wild plants, and yet produce silk, as he has already confirmed this by experiment. There is reason to believe from these experiments made by so celebrated a silk-grower, well known by the numerous services he has rendered in rearing and improving the race of silkworms, that the culture of silk will receive a development, the limit of which can hardly be foreseen, as the object is nothing less than to convert the vegetable matter of the most common leaves into the valuable substance of silk."

(*Proceedings of the Entomological Society, for Dec.*, 1854.)

On the Culture of Flax in the North-West Provinces, for the sake of its Fibre: by DR. JAMESON.

TO THE COMMISSIONER OF N. W. PROVINCES.

DATED AGRA, 12*th January*, 1855.

Revenue,
Present, R. K. DICK, ESQ.,
Officiating Member.

SIR,—I am directed by the Sudder Board of Revenue to enclose lithographed copies of the correspondence noted in the margin for the information of yourself and

Government order, No. 2571 A of 1854. dated 20th December; enclosures of Do., viz., Report, Superintendent Botanical Gardens, N W.P., to Government No. 634 of 1854. dated 9th December.

Government order No. 2570 A of 1854 dated 20th December,

the Collectors of your division, regarding the cultivation of flax in India.

2nd. The Board request that attention may be directed to the subject, and should any experiment be made in your division, that its nature and results may be reported.

I have, &c.,
H. W. HAMMOND,
Officiating-Secretary.

No. 2571 A of 1854.

To G. J. CHRISTIAN, ESQ.,
Secretary, Sudder Board of Revenue, N.W.P.

DATED CAMP, LULLUTPORE, 20*th Dec.*, 1854.

Revenue Department.

Sir,—I am desired to forward for communication to the local authorities, copies of the correspondence noted in the margin, regarding the cultivation of flax in India in Suharunpoor and Dehra.

From Superintendent Botanical Gardens, dated 9th December, No. 634, to ditto of this date.

I have, &c.
(Signed,) W. MUIR,
Secretary to Government N.W.P.

No. 634.

To WILLIAM MUIR, ESQ.,
Secretary to Government N.W.P., Agra.

DATED SUHARUNPOOR, 9*th Dec.*, 1854.

General Department.

Sir,—I have the honour to acknowledge the receipt of your letter No. 4521, dated 17th ultimo, with enclosures.

As the season for sowing flax had arrived, and as any delay in making references would have probably rendered it impossible to try an experiment this season, I at once made arrangements to sow eight acres at Suharunpoor and then proceeded to Dehra, and selected ten acres of land for an experiment there. This land is now partly sown, and the remainder will be finished in a few days, and I trust that my proceedings will meet with the approval of the Honorable the Lieutenant-Governor.

That the Upper Provinces are admirably adapted for the growth of flax I am confident, from the experiment made by me on a small scale for several years. In 1851, I received a quantity of flax seed from Russia, which has been grown in the garden, and extensively distributed.

The late overseer, Mr. Kane, a native of Belfast, where flax is extensively grown, and in which trade he had been engaged, declared that the produce of Suharunpoor was equal to any thing that he had seen in his native country. Of this seed I sent a quantity to Lahore last season, where it was tried, and the fibre prepared by a European, and the report made on this experiment by parties in Calcutta* was deemed so satisfactory by the Agri-Horticultural Society of Lahore, as to induce them to recommend to Government that rewards be offered for the largest quantity grown, and at the same time that all the seed and fibre, fitted for the manufacture be purchased at a certain valuation, which Government sanctioned. Such *encouragement has been attended with the most beneficial results, as large tracts in the Bareo Doab, have been brought under cultivation with flax ;* but it remains to be seen whether the fibre produced from plants raised from native seed, will be fitted for the purposes of the manufacturer. It is true, as stated by Dr. Royle in his memorandum, that flax has been cultivated in India from time immemorial for the oil yielded by the seed, and it now remains to be seen whether the same plants if properly grown, and carefully prepared, will yield you a fibre fit for mercantile purposes, and that too at a cost sufficiently low to reward the grower. Up to this time natives have considered the fibre useless. That the flax prepared from imported seed will do so, I do not for a moment doubt, and if failure attends the extensive experiments now being tried, I would recommend the introduction of Belgian or Russian seed.

To prepare the fibre for the manufacture is a delicate process, and all that can therefore be attempted by us is the rotting process, or separating the fibre from the stem, and leaving the heckling to the European manufacturer. But whether this can be done with profit also remains to be seen, as it will depend on the value of the flax in the rough state. If it cannot be done, then I should beg to recommend that the Honorable the Court of Directors be solicited to depute two experienced hecklers with all the requisite implements from Ireland. We might go on blundering, and through time produce an article of value to the English market. If however this country can produce flax of a superior quality, it would, in my humble opinion, be a vast mistake to lose time in endeavouring to learn a process, when, at a small expense experienced hands might at once be procured, and at the same time the produce prepared by them would cover all the outlay incurred in procuring them. Under these men a number of natives might be placed to learn the process. At present a vast interest is at stake, the Russian markets, though closed, their produce finds exit by other channels, but still the wants of Britain in the raw material are far from supplied, and as the war progresses, we may expect to find the deficit greatly to increase, and thus cause much misery to the English manufacturer. To correct this, this country has ample means. The experiment in Bengal appears to have failed from late sowing and drought. The latter can never occur at least over vast tracts of the North-Western Provinces as soon as the great Ganges Canal is in working order, and which of course it soon will be ; such a product could not therefore be more opportunely brought into notice.

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* See report by the Committee of the A. and H. Society of India, in the original department of this No. of the Journal.—Eds.

The small experiments about to be tried here, and at Dehra, and at Jubblepoor, and other places in the North-Western Provinces, and the extensive Punjaub experiments, will, when completed, show how far flax cultivation is fitted for the N. W. Provinces.

A detailed report of the experiments conducted by me will be furnished to Government as soon as practicable.

I have, &c.
(Signed,) W. JAMESON,
Supt. Botanical Gardens, N. W. P.

No. 2570 A of 1854.

To W. JAMESON, ESQ.,
Supt. Botanical Gardens, Suharunpore, N.W.P.

DATED CAMP, LULLUTPOOR, 20*th December*, 1854.

Revenue Department.

Sir,—I am directed to acknowledge the receipt of your letter, dated 9th instant, No. 634, and in reply to state, that the Honorable the Lieutenant-Governor approves of the proceedings reported in para. 2, for carrying out the orders of Government regarding flax cultivation in Suharunpoor and Dehra.

I have, &c.,
(Signed,) W. MUIR,
Secy. to Govt. N.W.P.

Chinese Indigo—a New Kind Discovered.

Those who read my "Wanderings in China" may remember the account I gave of a valuable kind of indigo made from a species of woad *(Isatis indigotica)*, which is extensively cultivated in the level country a few miles to the westward of Shanghae ; I have now to notice another kind, equally valuable, if not more so, which is made from a species of *Justicia*, or from a plant of that natural order to which *Justicia* belongs. This kind is largely cultivated in the hilly country near Ningpo, or rather in the valleys amongst the hills. It seems to be easily cultivated—it grows most luxuriantly, and is no doubt very productive. Having evidently been introduced from a more southern latitude, it is not hardy in the province of Chekiang, any more than cotton is about Shanghae ; but nevertheless it succeeds admirably as a summer crop. It is planted in the end of April or the beginning of May, after the spring frosts are over, and it is cleared from the ground in October.

During this period it attains a height of a foot or a foot and a half, becomes very bushy, and is densely covered with large green leaves. It is cut before any flowers are formed. The Chinese method of preserving plants for next year's crop is most ingenious and well worth notice. I have already remarked that it is a tender plant, and consequently the roots left in the ground after the gathering season are all destroyed by the first frosts of winter. But the Chinese do not depend upon these for the next year's crop; nor do they take them up, or cover them in any way, but simply leave them to their fate, after having done their duty for one year. Cuttings are found to be much more vigorous and productive than the old roots, and to the preservation of cuttings the Chinese cultivator directs his attention. When the stems are cut for the manufacture of Indigo, a large quantity of them have their leaves stripped off and are afterwards taken into a house or shed to be properly prepared. The leaves thus stripped from the cuttings are thrown into the tanks with the other stems and leaves, so that nothing is lost except what is actually required for the purpose of propagation. The stems are now tied up firmly in large bundles, each containing upwards of 1000, and the ends of each bundle are cut across, so as to leave them perfectly neat and even, both at top and bottom. These bundles are each about a foot long, and, of course, nearly round. Having been thus prepared, they are carried to a dry shed or out-house, where, in some snug corner, they are packed closely and firmly together, and banked round with very dry loam. A portion of the dry soil is also shaken in between the bundles; and this being done, the operation is complete. Should the winter prove unusually severe, a little dry straw or litter is thrown over the surface of the cuttings, but nothing else is required. During the winter months, the cuttings remain green and plump; and although no leaves are produced, a few roots are generally found formed, or in the act of forming, when the winter has passed, and the season for planting has come round. In this state they are taken to the fields and planted. The weather during the planting season is generally showery, as this happens about the change of the monsoon, when the air is charged with moisture. A few days of this warm showery weather is sufficient to establish the new crop, which now goes on growing with luxuriance, and requires little attention during the summer—indeed none, except keeping the land free from weeds. In the country where this dye is grown, there are numerous pits or tanks on the edges of the fields, they are usually circular in form; and one which I measured was 11 feet in diameter, and 2 feet in depth. About 400 catties* of stems and leaves are thrown into a tank of this size, which is then filled to the brim with clear water. In five days the plant is partially decomposed and the water has become lightish-green in colour. At this period the whole of the stems and leaves are removed from the tank with a flat-headed broom made of bamboo twigs, an *admirable instrument for the purpose.* When every particle has been removed, the workmen employed give the water a circular and rapid motion with the brooms just noticed, which is continued for some time. During this part of the operation, another man has employed himself in mixing about 30 catties of lime with water, which water has been taken out of the tank for the purpose. This is now thrown into the tank, and the rapid circular motion of the water is kept up for a few minutes longer. When the lime and water have been well mixed in this way the circular motion is allowed to cease. Four men now station themselves round the tank and commence beating the water with bamboo rakes made for this purpose—the beating process is a very gentle one. As it goes on the water gradually changes from a greenish hue to a dingy yellow, while the froth becomes of a beautiful bright blue. During the process the head workman takes a pailful of the liquid out of the tank and beats it rapidly with his hand. Under this operation it changes colour at once, and its value is judged of by the hue it presents. The beating process generally lasts for about half an hour. At the end of this time the whole of the surface of the tank is covered with a thick coating of froth of the most brilliant colours, in which blue predominates, particularly near the edges. At this stage, it being desirable to incorporate the froth with the liquid below it, I witnessed a most beautiful chemical operation which took me completely by surprise, and showed how universally must be the knowledge of the effect of throwing "oil upon the waters." A very small portion of cabbage-oil - only a few drops—was thrown on the surface of the froth, the workmen then stirred and beat it gently with their flat brooms for a second or two, and the whole disappeared as if by some enchanter's wand. And so small a quantity of oil was necessary for this purpose that even when the cup had been emptied, and had only the oil that was necessary adhering to its edges, it was thrown into another tank, and produced the desired effect. The liquid, which is now darker in colour, is allowed to stand quiet for some hours, until the colouring matter has sunk to the lower stratum. when about two-thirds of the surface is drawn off and thrown away. The remaining third part is then drawn into a small square tank on a lower level, which is thatched over with straw, and here it remains for three or four days. By this time the colouring matter has separated itself from the water, which is now entirely drained off—the dye occupying 3 or 4 inches of the bottom in the form of a thick paste, and of a beautiful blue colour. In this state it is packed in baskets and exposed for sale in all the country towns in this part of China. What its intrinsic value may be when compared with the indigo of commerce, I have no means of ascertaining, but it is largely used in this part of the world, where blue is the most fashionable colour, judging from the dresses of the people, and it is possible that with our knowledge of chemistry a colour of this kind might be greatly improved. After being grown and manufactured as I have described, it is sold at rates varying from 50 to 100 cash a catty, say from 2*d.* to 4*d.* per lb. Some is sold as low as 30 cash, but this is very inferior; the greater part produced is sold from 60 to 80 cash a catty, and it must be of a very superior quality if 100 cash is paid. Like the Shanghae Indigo made from *Isatis indigotica*, it is called "Lien-ching" by the Chinese. I have just sent a large supply of the cuttings above described to the Agricultural and Horticultural Society of India, and hope the plant may prove of some value in a country where the Indigo of commerce is largely cultivated.*—*R. F.—Gardener's Chronicle*, *8th April*, 1854.

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* A Chinese catty is equal to 1⅓ lbs.

Gutta Percha in India. Extract of a letter from Dr. Hugh Cleghorn, Madras, to Professor Balfour, dated 13th January, 1855.

"Three days ago, my friend Colonel Cotton, of the Madras Engineers, sent me a piece of Gutta Percha from the Wynaad, with a twig of the tree producing it, which is a true *Isonandra*. I have on the table both the gum elastic and the branchlet, abundant proof of the important discovery. It is believed that the tree grows abundantly in Malabar, I have requested that a diligent search should be made. As telegraphic lines stretch across our Peninsula, the importance of the discovery can scarcely be overrated, now that the forests of Singapore are well nigh exhausted. The Government will take means to prevent a wholesale destruction in the present instance, by making the forest a royalty, or at all events placing the trees under strict conservancy. I await with deep interest further intelligence from the distinguished Engineer as to the extent of the Gutta Percha forests."—*Edinburgh New Phil. Journ.*, *April*, 1855.

Gutta Percha of Singapore.

Of the Gutta Percha very small quantities are now brought to Singapore; it has become a manufactured substance. A vast variety of its gum, at various prices, from three to thirty dollars a picul, is brought in by the natives. Some of these are deep red, some quite white, and many of them are hardly coherent, breaking down and crumbling between the fingers. These are cut and broken up, and cleared from the scraps of bark and wood which are generally found among them ; they are then boiled in an iron pan with cocoanut oil, and stirred until thoroughly amalgamated. This mixture is allowed to cool again, when it is broken up and reboiled with more oil, some times as often as four times, or until the mass acquires a certain tenacity. The good Gutta Percha sliced into thin shavings, is then added in greater or less proportion, according to the quality of the basis, and the whole well mixed. The Chinese who do this are very skilful, and manage to produce from a great variety of gums a very uniform article, wonderfully so, when it is considered that the gum is bought by the merchants in very small quantities at a time, as the natives bring it in. There seems to be great mystery about the Gutta Percha trees. I was in the heart of their country, and yet could get no body to show me a single tree. I think the fact is that they have all been long ago cut down within any reasonable distance of the settlements. I saw large quantities of the gum, though none of the best quality, on the Indragiri. I think I can distinguish at least five sorts, which are probably the produce of different trees ; or rather five classes of gums, for perhaps the species are many more, and yet, though I offered great inducements, I could not get even a leaf. Of course, if I had gone up with time at my disposal, I would have seen the trees in spite of all, for I should have gone into the woods with the Collectors, and this I hope some time to be able to do.—*Letter from James Motley, Esq., in Hooker's Journal of Botany, February*, 1855.

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* The plant sent by Mr. Fortune, appears to be identical with the "Room" dye plant of Assam, a species of *Ruellia*. The Society have received specimens of the Room dye from Major Hamilton Vetch, Deputy Commissioner of Assam, which have been valued in Calcutta at from Rs. 10 to Rs. 12 per maund, or from 3*d.* to 3½*d.* per lb.—Eds. *Journ. A. and H. Society.*

Monthly Proceedings of the Society.

(Saturday, the 14th January, 1854.*)*

W. G. Rose, Esq., Vice-President, in the chair.

Read a note from the President intimating his regret that indisposition prevented his attending the Meeting.

The proceedings of the last General Meeting were read and confirmed.

Election of Officers and Council, for 1854.

The Chairman announced that this being the Anniversary Meeting, the election of Office Bearers and Council for the current year, should be entered on. The members accordingly proceeded to the ballot, and Baboos Gobinchunder Sen, and Rajendrololl Mittra, who were appointed scrutineers, reported the result to be as follows:—

President.—The Hon'ble Sir Lawrence Peel.

Vice-Presidents.—The Hon'ble Sir Arthur Buller, Rajah Pertaub Chunder Sing, Mr. William Haworth and Baboo Gobinchunder Sen.

Secretary.—Mr. A. H. Blechynden.

Council.—Mr. A. Grote, Baboo Peary Chand Mittra, Dr. H. Falconer, Mr. W. H. Elliott, Mr. C. A. Cantor, Baboo Shib Chunder Deb, Dr. C. Huffnagle, Mr. Stewart Douglas, Mr. W. G. Rose, Baboo Ramgopal Ghose, Mr. W. Blundell, and Mr. R. M. Thomas.

Standing Committees.

The revision of the various Standing Committees was next taken into consideration. On the recommendation of the Council the names of the following Members were added to the Committees on Sugar, Coffee, Implements of Machinery, and Fruit and Kitchen Garden Committees respectively, viz., Baboo Ramgopal Ghose, Mr. Cantor, Major Abercrombie and Mr. S. Douglas; in the room of Mr. Henley, Major Fraser and Mr. George Taylor, who are absent. The names of Messrs. B. Warwick and R. M. Thomas were added to the Floricultural Committee, which required strengthening.

Elections.

The following gentlemen who were proposed at the last Meeting were duly elected members:—

Messrs. Edward Greenway; G. Berford, C. S., Richard Blechynden; Geo. Allardice, Dr. J. Fayrer, and Baboo Sham Chand Mittra.

Candidates for Election.

The names of the following gentlemen were submitted as desirous of joining the Society :—

James White Smith, Esq., of Kattulee factory, Kishnaghur,—proposed by Mr. J. F. Hedger, seconded by Mr. R. T. Larmour.

Henry Simpson, Esq., of Commedpore factory, Pubna,—proposed by Mr. James Stuart, seconded by Mr. M. Wylie.

F. C. Marshall, Esq., assistant Civil Engineer, Punjab,—proposed by Mr. R. Berkeley, seconded by the Secretary.

Charles Weskins, Esq., Merchant, Calcutta,—proposed by Mr. S. Douglas, seconded by Mr. W. G. Rose.

C. J. Montague, Esq., Calcutta,—proposed by Mr. Rose, seconded by Dr. Falconer.

Reports on various subjects.

The following Reports were submitted :—

1st. A joint report from the Floricultural Committee and Fruit and Kitchen Garden Committee, respecting the arrangements for the shows of the season. The Committees recommend that three Exhibitions be held in the Auckland Circus during the season, namely, on the 20th of January, the 25th of February, and the 14th of March,—the two latter being public holidays. The Committees suggest that, in future a show of vegetables be held in the Town Hall, earlier in the season—say about the 10th or 15th of December, combined with such descriptions of ornamental plants as may be then in flower, Dahlias, Chrysanthemums, &c. The Committees further recommend that in future, *bronze* medals be awarded to the native gardeners, in place of the present *silver* medals, with a prize in money, equivalent in value to a silver medal: and that as the Secretary has already been authorized to procure a new Die when in England, he be further instructed to arrange for a number of bronze medals (say one hundred) for the above purpose. The Committees prefer this recommendation from having been informed on good authority, that the silver medals, hitherto awarded, have been converted into money by the recipients.

2nd. From the Committee appointed at the last Meeting to determine respecting the provision of vegetable and flower seeds for 1854. The Committee recommend that supplies of vegetable seeds, be procured as last year from North America, and the Cape of Good Hope, and flower seeds from England, at a cost not exceeding Rs. 7,000, exclusive of freight and other incidental charges. The Committee suggest in reference to the disappointment experienced last year with the English flower seeds, that the next consignment be despatched later in the season, say by the 20th of September steamer, and that Mr. Carter be instructed to do so, if, by this delay, he can ensure to the Society a collection of seeds of the gathering of the *autumn of 1854. They would, however, recommend that a discretionary power be granted to the Secretary, to alter the above arrangement, should he during his approaching visit to London, deem it advisable, in consultation with* Mr. Carter, to order the despatch of the consignment a month earlier, as in 1852, when the seeds gave so much satisfaction."

3rd. From the Nursery Garden Committee, recommending that a sum not exceeding Rs. 250 be authorised for the erection of another conservatory of 140 feet by 26 feet, on the plan proposed by the gardener; it having been found that the present conservatories are not sufficiently commodious. The Committee further suggest that the sum of Rs. 150 be remitted to Dr. Jameson, Superintendent H. C. Botanical Gardens N. W. P., to meet the necessary expenses of glazed cases, and carriage hire for 250 peach grafts from the Saharunpore Garden to Meerut; and that an application be made to Government for a free passage for the cases from thence to Calcutta, by bullock train and steamer.

4th. From the translation Committee announcing that they have passed through the press, the third part of the first Vol. of the "*Indian Agricultural Miscellany*" in Bengali. "The Committee have reason to believe that if a moderate price be affixed to this publication it will meet with a ready sale. They beg, therefore, to recommend that the general gratuitous distribution of the work be discontinued, and that it be sold in the first instance below the cost price (about four annas) say two annas a copy." The Committee add that they have commenced the printing of Part 4, and hope to have it out of press in the early part of 1854.

Resolved.—On the recommendation of the Council, that the above four reports be adopted.

The Gardener's monthly statement was submitted. Mr. McMurray reports that the several kinds of tuberous roots cultivated in the Garden during the past year, are now ready for lifting, and he recommends, early applications for them, such as arrow root, Jerusalem artichoke, sweet potatoe, yams of sorts, and tapioca cuttings. The English mulberry plants raised from the seed purchased by the Society in 1851, have succeeded well, and cuttings of the same are now being put down, which will be ready for distributing to members during the ensuing season. The Gardener states that the Manilla hemp plant presented by Mr. Ackland, has made a healthy growth; that a case of plants lately received from the Botanic Garden, Mauritius, has reached in tolerably good condition; that the Sea Island Cotton seed presented by Mr. Nash, at the last meeting, and the old rice from Nepal received from Sir J. Colvile, have germinated 35 and 9 per cent. respectively. Mr. McMurray closes his report with a list of contributions to the Garden during December, 1853.

The Minutes of the Grain Committee, on certain samples from Burmah, which were received from the Commissary-General in November last, were submitted.

Resolved.—That a copy of these minutes be sent to Major Ramsay.

Read a letter from Mr. S. H. Robinson, tendering his services, to conduct the duties of the office during the Secretary's absence, for Rs. 300 per mensem. As Mr. Robinson cannot devote the whole of his time to the Society he proposes giving the services of an efficient assistant, to be in constant attendance at the Society's Rooms, during office hours, at his own expence.

Resolved.—On the recommendation of the Council, that Mr. Robinson's offer be accepted, provided his assistant is approved of by the Council.

Read a letter from the Rev. J. Long, returning his thanks for the copies of the *Indian Agricultural Miscellany* in Bengali furnished to him by the Society; stating how they have been distributed; adding that "they have been received very favorably, and the style has been found suited to the capacity of the middle classes among the natives. Mr. Long applies for some further copies of the above work, to bind up for a volume and deposit in various vernacular libraries for reference, and for a grant of twenty copies of Vols. 1 and 2 of the Transactions of the Society in Bengali.

Resolved.—That Mr. Long's requests be complied with.

Read extract of letters from Lieutenant-Colonel Jenkins, and Major Hannay, on the subject of cotton cultivation at Debroghur, Upper Assam. Major Hannay is very desirous of giving a further and more extended trial to the two foreign sorts which gave such a favorable return last season, viz. the "Sea Island" and "Petti Gulph," provided he can obtain a quantity of fresh seed by July next.

Resolved.—That Mr. Landreth, the Society's Seedsman at Philadelphia, be instructed to transmit a small portion of the cotton seed ordered from him, to the Society's agents in London, to be despatched from thence by a Screw Steamer *viâ* the Cape to meet the above application of Major Hannay. Further that the tobacco seed be also sent to England and forwarded from thence by the overland conveyance.

It was agreed, on the recommendation of the Council, that the sum of £50 be remitted to Messrs. Grindlay and Co., to meet the cost of the new die, bronze medals, &c., alluded to above.

The submission of a few other communications, and several donations was deferred to the next Monthly General Meeting.

Proceedings of the Society.

(Saturday, the 11*th February,* 1854.*)*

Baboo Gobind Chunder Sen, Vice-President in the chair.

The proceedings of the last General Meeting were read and confirmed.

The following Gentlemen, who were proposed at the last Meeting, were duly elected Members :—

Messrs. James White Smith, Henry Simpson, F. C. Marshall, Charles Weskins, and C. J. Montague.

The names of the following Gentlemen were submitted as desirous of joining the Society :—

Major James Stevens, Invalid establishment, Deyra Dhoon,—proposed by Mr. C. A. Cantor, seconded by Mr. W. G. Rose.

Capt. W. H. Lomer, 21st Regiment N. I., Sealkote,—proposed by Major H. Spottiswoode, seconded by Capt. F. C. Burnett.

Charles Horne, Esq., Civil Service, Bareilly,—proposed by the Secretary, seconded by Mr. W. Blundell.

Mr. Geo. P. Shearwood, of Calcutta,—proposed by Mr. Cantor, seconded by Mr. Rose.

Mr. R. J. Carbery, of Calcutta,—proposed by Mr. W. Cockburn, seconded by Mr. Joseph Willis.

R. G. Lord, Esq., M. D., (21st Regiment Bombay N. I.) Neemuch,—proposed by the Secretary, seconded by Capt. J. C. Brooke.

Arch. James Brown, Esq., Merchant, Mirzapore,—proposed by Mr. J. B. Higginson, seconded by the Secretary.

A communication was read from Mr. William Storm, with reference to which the following recommendation was submitted by the Council for disposal at the next Meeting.

"That Mr. William Storm be elected an Honorary Member in consideration of 'services rendered to the Society.'"

Presentations.

The following contributions were announced :—

1. Journal of the Indian Archipelago for April and May, 1853. *Presented by the Editor.*

2. A copy of the same work for the same period. *Presented by the Government of Bengal.*

3. Selections from the Records of the Government of India, No. 2, Report on the Administration of the Punjab for 1849-50 and 1850-51 : and No. 3, Sir C. Napier's resignation. *Presented by the Government of India.*

4. Selections from the Records of the Bengal Government, No. 13, Notes on the Manufacture of Salt in the Tumlook Agency, &c., &c. *Presented by the Government of Bengal.*

5. Journal of the Asiatic Society of Bengal, No. 6 of 1853. *Presented by the Society.*

6. A case of ornamental plants and fruit grafts from the Royal Botanic Garden, Mauritius. *Presented by Mr. Duncan, the Superintendent.*

These plants have reached in tolerably good condition.

7. Two pine-apple crowns of a superior description from Mauritius. *Presented by W. Storm, Esq.*

8. A further small supply of Seychelles Cotton Seed. *Presented by the Hon'ble C. J. Bayley, Colonial Secretary, at Mauritius.*

The Secretary stated that he had sent portions of this Seed to Major Hannay for trial at Deebroghur, in Upper Assam, and to Captain G. E. Hollings and Mr. J. H. Prinsep, for trial in the Punjab.

9. An assortment of maize, bean, melon, pumpkin, cucumber and other seeds, including the "Tootooi" and "Kau nuts," all from the Sandwich Islands. *Presented by Mr. R. J. Hollingworth.*

The following is extract of Mr. Hollingworth's letter respecting a few of these Seeds :—

"*Tootooi Nuts.*—These nuts are used by the natives as candles. The kernel is of a very oily nature,—and the oil expressed from it is an article of commerce at Honolulu. The tree is very beautiful and umbrageous, growing to the height of from 60 to 80 feet. These seeds take a long time to vegetate.

"*Kau Nuts.*—The trunk of this tree frequently exceeds three feet in diameter. The wood is much prized, being in color like mahogany, and taking a very fine polish. The native chiefs use the wood for their dishes.

"Bahama Grass Seeds (Manchama) a sweet scented ornamental and very nutritious Grass."

10. A few bunches of grapes, apparently the Muscatel variety, the produce of the Vines referred to in his communication, submitted at the General Meeting of December, 1853. *Presented by Mr. J. Thompson.*

11. Sample of an extract from an Euphorbiaceous plant, probably *E. ligularia. Presented by Dr. Riddell.*

"Dr. Riddell wishes to be informed what is thought of this substance, which he thinks, from its compactness, sweetness, and purity, in every way may be compared to the article of commerce so much in demand—Gutta Percha."

The Secretary intimated that he had transferred this specimen to Dr. O'Shaughnessy, who had forwarded it to Mr. Brunton, Deputy Superintendent Electric Telegraph, Madras, for official report.

12. A further and better prepared specimen of arrow-root powder, raised and manufactured at the Baraset Garden. *Presented by Baboo Peary Churn Sircar, Secretary Local Committee, Public Instruction Baraset.*

13. Two specimens of cotton raised at Deebroghur, Upper Assam, from foreign seed supplied by the Society, and two specimens of indigenous cotton. *Presented by Major S. F. Hannay.*

Major Hannay is desirous of an opinion on these musters, and for a further and larger supply of fresh American seed to reach Assam in July next, the best time for sowing.

The Secretary stated that in accordance with the Resolution passed at the last meeting, he had taken the necessary steps to meet Major Hannay's request for fresh seed early in the season. He had also referred the samples in question to Mr. James Cowell, who had favored him with the following report on them :—

"No. 1. Foreign seed grown at Deebroghur in Assam, 1853, is descended from Sea Island Stock, as the seeds show, Fibre long and fine, an excellent cotton. I observe by Littledale and Co.'s Price Current, that Sea Island Cotton was quoted last December, in the Liverpool market at 22*d* to 24*d* per ℔., for 'fine to good fine' (under which denomination I should class this fibre) and 28*d* to 36*d* per ℔. for 'good to fine' qualities. If Major Hannay could send us down a few bales of this cotton for shipment home we should better arrive at its true value than by the inspection of a small sample. I should imagine that the prices quoted would be amply remunerative and induce cultivation on a large scale.

"No. 2. Foreign seed grown at Deebroghur, appears to be from the New Orleans variety. Short staple, and wool adhering tenaciously to the seed. A good cotton, worth in Liverpool probably from 5⅞*d* to 6*d* per ℔. if well cleaned. Fibre strong and pretty fine in length and complexion.

"Nos. 1 and 2. Native Jaloha and Derakuppas are very similar in quality : fibre rough, strong and short, as usual."

The following were also placed on the table, the produce of the Society's garden :—

A specimen of cotton raised from the "Maltese brown cotton seed." *Presented by Mr. Piddington in May,* 1852.

This specimen, (like that raised by Mr. Piddington from the same supply of seed, and presented in November, 1852,) proves to be a *white* cotton, of fair length and strength of staple, and separating more easily from the seed than the Maltese brown variety.

Two ears of Maize, raised from American seed of the sort termed "Cooper's Prolific Corn."

These ears are fully equal in every respect to the original stock, though grown out of season.

A small quantity of Demerara Indigo seed raised from seed. *Presented by Mr. Piddington, in September,* 1852.

A fine healthy plant of the Cape heath *(Erea speciosa) in flower*, raised from seed. *Presented by Mr. Emerson, in October,* 1852.

Horti-Floricultural Exhibitions.

Read the following reports of the Judges at the show of vegetables, fruits and flowers, held in the Auckland Circus, on the 20th of January.

"In submitting the annexed list of prizes awarded at the first Horticultural Exhibition of 1854, the Judges beg to add a few remarks:—

"*First, in regard to Foreign Vegetables.* The collection was, on the whole, a very satisfactory one. The cauliflowers, which occupied a prominent place, were well represented; the heads being large, solid and well formed. The green curled and corn kale were more abundant and better grown than those exhibited last year. Of Brocoli, two kinds were submitted, the 'sulphur' and 'large white;' the former was neither plentiful nor good: the latter was more abundant and well grown for so early in the season. Cabbages of five kinds were brought forward, namely, the 'Dwarf York,' 'Battersea,' 'Savoy,' 'Drumhead,' and 'Red.'—All these were fully as well grown as last year when the display was considered so good. The red and white Nole-kole were plentiful, and of a nice medium size. The green curled and broad leaved Endive were well grown, fairly blanched, and in abundance. Only four baskets of Spinnage were shown; but they were well grown, fresh, and of a good green color. The Cabbage and Coss Lettuce were as usual in abundance and fairly grown. Six (6) sorts of Turnips were submitted for competition, the white flat, Dutch stone, yellow stone, large white globe, red top and Swedish: the two first were of good quality, well shaped and abundant; the Swedish was more plentiful and better grown than last year; the red top was scarce, but the specimens were well formed. Of Carrots there were four kinds, all well represented, especially the altringham and short horn: the long, red and yellow are more adapted for feeding cattle. The Potatoes, of which there were four kinds, were equally as well, if not better, represented than last year; there has not, probably, been so fine a display on any previous occasion. Beans of four sorts were submitted, the Dwarf French, White Runner, long pod, and scarlet runner: the two former were plentiful, tender and well grown; the two latter were scarce, but shewing an improvement on previous specimens. Of Peas there were four distinct sorts tender and well flavored, more especially the Imperial blue and marrowfats. It being a difficult matter to distinguish several of the kinds of peas after being picked, we would recommend that each exhibitor be instructed to place the correct name of the peas in each basket; and with the view of inducing the gardeners to adopt this recommendation, not only as respects peas, but other sorts of vegetables, additional prizes might be given for the best and most correctly named specimens. Only two bunches of Asparagus were shown, both well grown for the time of year. The red and white celery shewed an improvement, more especially the red kind raised from seed, which seedlings are so superior always to the offsets of a previous year which, indeed, are only fit for soups, &c. Water-cress was in abundance, as also pot-herbs, such as thyme, savory, sage, parsley and mint. The turnip-rooted and long red beet were in abundance and of good quality. The Judges beg to add the following note from the Society's gardener respecting this vegetable :—

"The native gardeners do not seem to be aware, that to keep the dark red colour in the root is the main feature and best quality of beet. This can only be effected by careful lifting in such a manner that not the smallest fibre be broken or bruised, as that is what gives the root a pale color from bleeding at the wounds caused by careless lifting. Neither should it be washed after lifting, nor before the root is half boiled at a low fire ; when the outside skin will peel off, and leave the heart clean and of a good bright color. The leaves should also be cut off at least two inches above the main crown, to prevent bleeding as much as possible."

Of Native Vegetables, there was a fair display of beans of sorts, yams of several kinds, gourds, tomatos, saugs and maize.

In the Fruit Department, pomegranates, sapotas, oranges, pine-apples, rose-apples, guava, pumplenose, plums, bel, plantains, &c., were shewn, to several of which prizes were adjudged.

The Judges have to remark, in conclusion, that the show was, on the whole, very creditable to the *mallees,* of whom upwards of 200 were in attendance, to 67 of which prizes, amounting in the aggregate to Rs. 299, were awarded by the Rajah Pertab Chunder Sing, a Vice-President of the Society.

(Signed) W. G. Rose.
„ Peary Chand Mittra.
„ St. Douglas.

Floricultural.—"The Judges have to report that the competition at this first show of the season was limited, not exceeding that of last year, which was considered as inferior to the exhibition of 1852. The produce of thirty gardens only was submitted, to seventeen of which prizes, amounting to Rs. 75, were awarded, as per details noted on the annexed sheet.

The plants, perhaps, most worthy of notice, were the Camellias, red and white, of which a dozen were brought forward. The collection of Roses were better than at any previous show. The *Pelargoniums* were not in flower, but a prize was awarded to the best collection of fifteen sorts, as it included several exceedingly well grown plants. Some fair samples of Euphorbia Jacquinflora were exhibited, as also a well-grown plant of Troopeolum tricolor, and a cut specimen of Habrothamnus fasciculatus, the two latter being novelties at these shows.

The Judges have again the pleasure of bringing to the notice of the Society the kind and material assistance so obligingly rendered by Major Burn, Town Major; Major Bazely, Deputy Principal Commissary of Ordnance, and by Major Abercrombie, Officiating Garrison Engineer, in the loan of tents and stands, and for the use of the ground in the Auckland Circus on which the show was held.

The number of visitors was as great if not greater than at any previous show; it is calculated that between two and three thousand persons were present. No band was available.

(*Signed*) *H.* Falconer.
„ Benj. Warwick.
„ R. M. Thomas.

In connection with the above, it was moved by Mr. Warwick—"that there be a fourth flower show, to be held in the Town-Hall early in April, say on the 7th, being a public holiday." Referred to the Council.

The Gardener's Monthly statement was read. Mr. McMurray reports that all the peach trees are making a healthy growth, and have set a heavy crop of fruit, which will aid in testing the experiment of under-drainage recently adopted. The mango and lychee trees are backward, and are not likely to yield much fruit this season, arising from an after growth which took place in October last. The American Sumach trees are now producing a large crop of seed, which will be ready for distribution in April next. The American maize of last season's importation is also ripening a fine crop of corn, which will be available to members in time for planting during the next rainy season. The pea crop is more vigorous, and bearing a heavier crop this year than any previous one, arising from the top dressing the ground received last year. Mr. McMurray adds,—"the accompanying plant of Cape Heath (*Erica Speciosa)* in flower is the produce of one kind of the seed presented to the Society by A. Emerson, Esq., on the 20th October, 1852, from which it will be seen that the plant has made a good growth since that time, and is probably the first plant of the sort which has flowered in Bengal. In addition to this variety of Heath there are in the Garden ten other kinds raised from the same batch of seed—equally as healthy, but not so large. In conclusion, I have to remark that the large plant of *Victoria Regia* is going on satisfactorily, but that eight of the smaller *Victorias* have been killed by the cold weather."

A statement from the Gardener, shewing the result of the sowings of the German and French flower seeds received in September last, was also submitted; from which it appears that of eighty-one sorts of German seeds put in the ground, thirty-one have only germinated, and these, with few exceptions, very partially. Of 263 kinds of French seed only 103 have germinated, some freely and some indifferently.

Defaulter to the Society.

The Council having brought to the notice of the Meeting that Mr. R. C. Bell had failed to pay the amount (Rs. 164) due by him for fruit grafts supplied in December, 1851 and January, 1852, it was resolved that, in accordance with the provision of Section 7 of Chapter III. of the Bye-Laws, his name be published as a defaulter.

Amendment by Mr. W. G. Rose. " That as Section 7 of Chapter III. was altered after the claim upon Mr. Bell arose, the rule, in its altered state cannot have retrospective effect, and does not, therefore, apply to the Society's claim upon Mr. Bell." Put to the vote and lost.

Communications on Various Subjects.

The following letters were likewise submitted :—

1. From A. J. Brown, Esq., dated Mirzapore, 24th January, submitting some remarks on the subject of coffee planting in Southern India, and the advantages it offers in comparison with Ceylon. Referred to the Committee of papers.

2. From Captain G. H. Hollings, dated Shahpore, Punjab, 15th January, further facts on the useful properties of the Mŭddār plant, *(Calatropis Hamiltonii.)*

" Since I last wrote to you I sent some moulds made of Mŭddār Gutta Percha to Mr. Berresford, the Secretary of the Delhi Bank, in order that he might try some experiments to ascertain if they could be used with advantage in Electrotyping. He sent me back as the result of his experiment a fac-simile in copper of the impression of a silver coin, and mentioned that the mould was not in the slightest degree injured. He writes that the Mŭddār possesses the following advantages :—

" 'It appears to produce most faithful copies of the coins without much pressure, which would be of much importance if copying a plaister of Paris or other medallion of like brittle nature.

" 'The connecting wire of the battery is most readily attached to the impression. It requires no varnish on the back and sides to prevent injury to the mould, the sulphate of copper, so far as I can judge, not having affected it in the slightest degree.

" 'The face or impression receives a coating of plumbago, and rubbing with cotton, till a good polish is obtained without the least injury to the detail of the impression.'

" The only objection that occurred to Mr. Berresford was that the moulds sent to him were too plastic, which caused a difficulty in removing the deposit of metal without injuring it. This was caused from my having sent new moulds. After they have been kept for two or three months, they become much harder, which removes the difficulty effectually.

" I had lately an opportunity of passing through a part of my district in which gunpowder is manufactured, and learnt that the wood of Mŭddār is considered the most valuable for converting into the charcoal used in the composition of that powerful agent of destruction, and in the course of some experiments I have lately been attempting to produce good gas for purposes of illumination from the coal found at Kalabagh and in different parts of the Salt range. I had opportunities of seeing that the gas produced by combustion from the wood of Mŭddār, after the fibre has been removed, possesses great illuminating power.

"It may be as well to state the result of all attempts that have been made to utilize the Mŭddār, and the products obtained therefrom.

"Before any attempts had been made by Europeans to ascertain its properties, the natives had extracted medicines from the roots and used the milk as a poison ; in the Punjab, it was applied to the nurse's breast, and found an efficient means of ensuring the death of female children—the smallest portion imbibed with the milk being sufficient for the purpose—the large roots were hollowed out to form the lower portion of the musical instrument called a sitar, including the sounding board. In some parts of the country twine was made from the fibre. The leaves are soaked in water, and used for tanning in many parts of the Punjab. The wood converted into charcoal was used in the manufacture of gunpowder. The Journal of the Agricultural and Horticultural Society records the manufacture of fine cloth from the cotton formed round the seed. 2. The preparation of thread, twine, rope, and coarse cloth, from the fibre—in a series of experiments made with the object of ascertaining how far the product could be used as a substitute for hemp or flax. 3. The preparation of a substance from the milk as an equivalent for Gutta Percha. The qualities of the wood, and their value of producing illuminating gas remain to be ascertained. With so many valuable properties, it will be strange if we do not soon learn to utilize the Mŭddār, which has hitherto been thought so little of."

3. From Dr. O'Shaughnessy, Superintendent Electric Telegraph, reporting on the Mŭddār extract received from Captain Hollings as a proposed substitute for Gutta Percha. "A single experiment," observes Dr. O'Shaughnessy, "suffices to prove its total inapplicability to telegraphic purposes. In the thickness used for coating wires it remains soft and adhesive like glaziers putty at the temperature of 61° Fahrenheit. I have forwarded the parcel to Mr. Brunton, at Madras, for further examination and report."

4. From Dr. Falconer, forwarding the following extract of a letter to his address from Major J. Clarke, Deputy-Commissioner, Goozranwalla, Punjab, dated 2nd January :—

"I write now to ask your assistance to get me some Cotton seed for distribution among the zemindars of my district. The kind I should like to have is what I believe is called *Pettigulf* or *gulph*. I find this description thrives very well here. I consider that it is likely with any thing like encouragement with seed, to be *very largely* introduced in supercession of or addition to the ordinary kind. I have tried it two years, and have many applications for seed, but my stock is small. What I grew this year was grown in a field. I treated it exactly like common country cotton plant. The produce is very superior, and the plant seems to have stood the drought quite as well as the country kind; the crop is also *much* heavier than the country kind gave. Our soil is usually a light sandy loam, till we touch the Chenab or the Ravee, the flats of both of which I imagine might grow Sea Island Cotton, but cultivation on those flats is precarious.

"If you can send me any Cotton seed of the Pettigulph kind, it ought to be sent off at once, as our Cotton sowing begins the end of February, lasting all through March.

"I presume that the seed might be sent on the public service.

"I imported some Egyptian seed last year; the Cotton plants looked very fine and grew to a large size, but the produce is all poor, color bad, and pods small; it failed, I may say, perhaps from want of proper treatment."

The Secretary intimated that he had transferred to Dr. Falconer all the Cotton seed in store of last year's importation of the kind applied for by Major Clarke.

5. From J. W. Payter, Esq., of Bogra, dated 19th December, respecting the flowering of the Sugar Cane :—

"I was somewhat amused to observe the allusion made at a late meeting of the Society, to the fact of the rarity of Sugar-cane appearing in blossom. Twelve years ago, I had whole fields in blossom; this was from the cane I got from the Society; being unable to break through the prejudices of the ryots that year to cultivate it, the crop remained mostly uncut and *all* ran into tufts; but I regret to say I took no steps to ascertain whether it contained anything like seed or not. I have seen country cane in blossom, but very rarely, and only one or two here and there. The Rattans produce tufts more generally than the first crop."

6. From S. Mornay, Esq., enclosing a list of Brazilian plants, which he thinks would prove desirable introductions into India.

7. From Messrs. Bates, Hyde and Co., of Bridge-rates, Massachusetts, acknowledging receipt of a remittance of £250, being the amount awarded by the Government of India for their Saw-gin.

8. From Messrs. Hamilton, Higginson and Co., of Mirzapore, acknowledging receipt of the Special Committee's Report on the Cotton-cleaning Machines submitted for competition, and offering some remarks thereon with reference to their previous communication.

9. From Messrs. Grindlay and Co., London, acknowledging receipt of specimen of Munjeet Garancine and of Mŭddăr extract and fibre, which they have transferred, as directed, to the Society of Arts.

10. From the Rev. F. Schurr, tendering his acknowledgments for seeds supplied for the use of the Christian Settlement at Kapasdanga, in the Kishnaghur District.

11. From W. Blundell, Esq., acknowledging receipt of notice of his election as a Member of the Council; and intimating his readiness to co-operate to the best of his ability in advancing the interests of the Society.

12. From W. G. Young, Esq., Under-Secretary Government of Bengal, intimating, in reply to the Society's application, that a free passage will be given by steamer from Allahabad to Calcutta for the six cases of fruit grafts *from the Botanic Garden at Saharunpore.*

13. From S. H. Robinson, Esq., acknowledging receipt of his election to the office of Acting-Secretary, and recommending Mr. Flouest as his Assistant. The Council having intimated their approval of this nomination, it was resolved that Mr. Flouest be confirmed in the office.

14. From R. Clarke, Esq., Honorary-Secretary Royal Asiatic Society, returning thanks for a copy of Part 2 of Vol. VIII. of the Journal, and applying for certain previously published Nos. to complete the set in their library. Resolved, that this request be complied with.

It was agreed, on the recommendation of the Council, that a further sum of £22 be remitted to Messrs. Grindlay and Co., to meet the cost of the new die, gold and bronze medal, &c., alluded to in the last month's proceedings.

(Saturday, the 11*th March,* 1854.*)*

The Hon'ble Sir Lawrence Peel, President in the chair.

The proceedings of the last General Meeting were read and confirmed, and the following gentlemen, who were proposed on that occasion were duly elected members. Major Jones Stevens, Captain W. H. Lomer, Messrs. Charles Horne, Geo. P. Shearwood, R. J. Carbery, R. G. Lord, and Arch. James Brown.

The names of the following gentlemen were submitted as desirous of joining the Society:

Mr. J. Finch, Indigo Planter, Bubnowlee Factory, Goruckpore,—proposed by Mr. W. Earle, seconded by Mr. J. Willis.

D. Simson, Esq., C. S., Leia, Punjab,—proposed by Mr. M. Wylie, seconded by Mr. C. R. Prinsep.

Mr. Thomas John Watson, Merchant, Calcutta,—proposed by Mr. G. Ackland, seconded by Mr. W. G. Rose.

Mr. Wm. Stewart, Indigo Planter, Deahree Factory, *viâ* Shergotty,—proposed by Mr. R. Blechynden, seconded by Mr. W. G. Rose.

Mr. Henry Deverell, Indigo Planter, Ackerygunge Factory, Berhampore, —proposed by Mr. Robert Watson, seconded by Mr. C. A. Cantor.

Presentations.

The following contributions were announced:—

1. *Journal of the Asiatic Society of Bengal, No. 7, 1853. Presented by the Society.*

2. A few Potatoes raised at Akyab. *Presented by Captain J. W Cannon.*

These were not otherwise remarkable beyond being, Captain Cannon believes, the first of the size grown in Arracan.

3. *A collection of Chinese seeds and specimens for the Society's Museum from Mr. R. Fortune.*

The following is the substance of Mr. Fortune's letter accompanying the above, dated Shanghae, December 30th, 1853:—

"In accordance with instructions received from the Government of Bengal, I have the pleasure to send you a large collection of seeds, &c., which I have collected for the Society during this autumn and winter in the Central and Eastern Provinces of China. The box containing these seeds has been shipped in one of the Peninsular and Oriental Company's steamers, which leaves this port to-day, and I have the honour to enclose a Bill of Lading, by which you will observe the freight is made payable in Calcutta.

"All the seed papers are marked with names and numbers, and I also enclose a detailed list of the whole in this letter. You will observe, I have included five varieties of rice grown in China, and I have given you the names by which they are known, in order that larger supplies may be procured, should you consider all or any of them of sufficient value. I also send two kinds of Millet which are extensively grown in the Tea districts, and often between the rows of the bushes, in order to afford a slight shade during the hottest weather in summer. Specimens of these in ear are also sent for the Society's Museum.

"When in the Province of Chekiang last autumn, I procured a specimen of the Hemp Palm (Chamærops—sp.) and I now send you a portion of its stem, shewing the large quantity of fibre it forms under the leaves. This fibre is of great value to the natives who use it for a variety of purposes, such as ropes, cables, twine, brushes, hats, cloaks, &c. The detached sheets I send in the Box will shew how it is cut from the tree. I trust these articles will be acceptable additions to the Museum of the Society.

"Nos. 13, 14, and 15 are seeds of plants cultivated in China for their fibre, and which, if not already in India are not worth introduction. One of them —the Luk Ma—seems identical with the Indian 'Jute,' which is now becoming an article of considerable importance. No. 9 contains seed of the 'Tong-eau,' from which a valuable wood oil is expressed, much used by carpenters. No. 10 contains seeds of a kind of Hawthorn, from which excellent jellies and other preserves are made. Nos. 20, 21 and 22 are used as soap by the natives, and the latter is that described by Dr. Falconer in the 7th Volume of the Society's Journal.

"In addition to these various productions I must draw attention more particularly to Nos. 18 and 19. These papers contain ripe seeds of the *Green Indigo* (so called) which is so much thought of by the French chymists, and to which my attention was directed by Dr. Falconer, and Mr. Henley through the Government of India and the Society. I have also succeeded in procuring plants of the cultivated kind, which I shall take an early opportunity of forwarding to the Society. I need not remark upon the importance of taking great care of these seeds, but I may suggest the propriety of sending a portion of them to a cooler climate than that of Bengal, say the N. W. Provinces or Assam, where they will probably succeed quite as well as they do in China. As I gain more information concerning this important dye, I shall not fail to communicate it to the Society.

"I have only to add further, that the box contains a good supply of the seeds of various ornamental trees, such as Cryptomeria Japonica and the Funeral Cypress, which I hope will one day produce useful timber, and give another feature of beauty to the Indian landscape."

The Acting-Secretary stated that a portion of these seeds had been forwarded on arrival to the Society's Nursery Garden. It was agreed that the remainder, the whole quantity being limited, should be distributed to a few of the most active members of the Society in different parts of the country, who would give them a fair trial and report the result to the Society, and that it be referred to the Nursery Garden Committee to prepare a list of such Members accordingly.

4. A second sample of Tapioca grown and manufactured at Beerbhoom by Messrs. Sumboo Chunder Ghose and Co. *Presented by Baboo Preonauth Sett.*

This sample was admired by several members present for its superior quality.

5. Eleven and a half seers of Ceylon Coffee seed. *Presented by G. W. Thwaites, Esq., Superintendent Royal Botanical Garden, Ceylon.*

Half of this was sent for trial to the Society's Nursery Garden, the remainder is available for distribution to members.

6. Thirty-six and a half seers of Tapioca, from the Society's Nursery Garden.

7. Four cases of Chinese plants and seeds from Mr. R. Fortune.

The following is Mr. Fortune's letter referring to the above, dated at Hong Kong, 14th February, 1854 :—

I have the pleasure to inclose a Bill of Lading and list for four cases of plants and seeds collected by me for the Agricultural and Horticultural Society of India. These cases were shipped at Shanghae on the 19th of Jany., and I have now seen them re-shipped at Hong-Kong for Calcutta. They contain a number of plants, which I believe to be of great value and interest, and I hope they will reach you in good order.

The detailed list which I enclose will give you nearly all the information which is requisite, but I cannot help drawing particular attention to the *Green Indigo* plant (so called)—the 'Lo-yah' or 'So-lo' of the Chinese—which I have discovered this year in the Province of Chekiang. In my last dispatch, I sent you some seeds of this valuable species, and I have now the pleasure to send six healthy young plants in cases Nos. 3 and 4. These cases contain also a number of cuttings of another plant, which is extensively cultivated in the same Province on account of a blue dye which it furnishes, and which is, in fact, the Indigo of that part of China. I have sent a detailed account of the cultivation and manufacture of this important dye to Professor Lindley for publication in the *Gardeners' Chronicle and Agricultural Gazette*, and must refer you to that Journal for further particulars.

With regard to the fruit trees in these cases I may draw attention to the 'Yang mae' (Myrica—sp:) which I think will be valuable in India; to the 'Kum-quat' (Citrus Japonica) well known from the excellent preserve of that name, which is made from it; to the Shanghae and Flat Peaches, two kinds of great excellence, and to some seeds of the Chinese Chesnut, which I have so[illegible] the soil of case No. 3., and which will probably vegetate on the voy[illegible]cutta.

[illegible]ngst other things of interest on account of their useful properties, I may notice the Varnish tree, the Wax Insect tree, the Hemp Palm, the Soap Bean tree, and the Salisburia, which forms one of the largest timber trees in the Central and Eastern Provinces of China.

The other plants in the cases are of an ornamental kind. Most of them have been introduced into Europe within the last ten years, and will be found described and figured in the various Botanical and Horticultural periodicals.

In conclusion, I have the honor to acknowledge the receipt of your letter, dated November 18th, enclosing a translation of a memoir by M. Persoz and a list of plants you are desirous of receiving from China. I have also to acknowledge the safe receipt of your Bill on the Oriental Bank, for Sa. Rs. 200, and shall endeavour to spend that sum in a way that will tend to promote the interests and honor of your Society.

These cases were forwarded on arrival to the Society's Nursery Garden, and the Gardener's report thereon is, that out of 431 plants, including seeds germinated on the voyage, 342 have arrived in good health, fifty-two sickly, and thirty-seven dead.

Horticultural Exhibitions.

Read the following reports of the Judges at the show of Vegetables, Fruits, and Flowers held in the Auckland Circus, on the 14th February.

In submitting the annexed list of prizes awarded at the second Horticultural Exhibition of 1854, the Judges remark:—

The Judges beg to offer the following remarks regarding the specimens submitted at the second exhibition of vegetables and fruits held in the Auckland Garden, on the 25th of February, 1854.

First, in regard to Foreign Vegetables.—The cauliflowers, purple and white brocoli, were not perhaps so abundant; nor yet so good as might have been expected at this season. Seven kinds of cabbages were placed on the table, sugar-loaf, savoy, battersea, red, drumhead, dwarf and large york, all of excellent quality. Of green curled and cow kale, there were a few baskets only, but of good quality. The broad leaved and curled endives were in abundance, and well blanched. Of lettuces there were four sorts, brown, Dutch, Paris coss, cabbage and black seeded. The celery is improving, several well-grown specimens were shown, tolerably solid, and well blanched. The purple and white nole-kole were plentiful and of fair quality for the lateness of the season. The American white flat, yellow stone, white globe, yellow globe, and Swedish turnips were plentiful and good. Of carrots, six well grown kinds were brought forward, viz. altringnam, long red, short horn, large white, purple colored, yellow, and a large straw colored, and apparently new variety. The turnip rooted and long red beet were shown in abundance and of fine quality. The early white, long, red and deep *set eyed* potatoes were in abundance, and perhaps equal in quality to any previous exhibition. The Windsor and long pod beans were of good quality and the latter in abundance. Several baskets of peas were placed on the stands, of which the imperial blue and marrow took the lead. The specimens of squash were poor in quantity and quality. A few fair bundles of asparagus for the time of year were submitted, tender, and having the proper purple bloom at the point of the shoots. Several baskets of globe artichokes were shown well grown and in excellent condition. Of other vegetables it may be observed, that the onions and leeks were in abundance, and of good quality, the large tomatos, yellow and red capsicum exceedingly good; the collection of pot-herbs equal, perhaps, to any previously shown: water and curled cresses plentiful and good. Horse-radish scarce and poor.

Fruits.—In this department there was a tolerably fair display of pomegranates, sapotas, oranges, pine-apples, guavas, papeeas, long and round plums, *(zizyphus)* bale, limes, loquats, strawberries, plantains, &c.

Of Indigenous Vegetables.—There was a large assortment, especially of yams and saugs of sorts.'

The competition was very spirited. Upwards of 200 gardeners were in attendance.' Prizes amounting to Rs. 262 were awarded to fifty-two, by the Rajah Pertab Chunder Sing, Vice-President, in the order shown in the annexed detailed list.

(Signed) G. W. Rose,
„ Peary Chand Mittra,
Wm. Haworth.

Horticultural.—The Judges have to report that this show was not better than the second exhibition of last year, and by no means equal to that of 1852. Among the few novelties were two or three well grown plants of Velthamia, a few of Rogerracordata, one of an Azalea, and another of Kennedya. Some exceedingly fine plants of Pelargoniums were shown, a good collection of oxalis, and a few fair Camellias. Of the more common order of Annuals, which were well represented, Schizanthus, Clarkias and Portulacas took the lead.

The amount set apart for prizes was Rs. 289, but Rs. 111 only were awarded, as per detailed list annexed.

(Signed) H. FALCONER. M. D.,
„ R. M. THOMAS,
„ W. H. ELLIOT,
„ A. GROTE.

The Gardener's monthly statement was then read.

Mr. McMurray reports as follows :—In continuation of my report for January last, I have now to state that my anticipations regarding the mangoe and lychee trees showing but few bloom buds this season, were quite correct, and more especially observable in the case of the Mangoe trees, which have made a healthy growth. Four plants of the two lines of Avocado Pear trees grown on each side of the cross walk leading into the orchard ground, are now producing flowers for the first time. The Vanilla Aromatica, and Grandiflora plants running up the large Almond tree, are also showing a fair number of flower spikes, from which it may be hoped that a good crop of pods will be produced. One of the five seeds of *Nelumbium luteum* received on the 4th, and sown on the 5th October last from the Botanical Garden, France, germinated on the 2nd instant—the seedling is now doing well.

Mr. French's presentation of twelve seeds of the *Cæsalpinia Coriarium* or *Shumach* were received on the 28th, and sown on the 29th January last, and have germinated freely.

Mr. W. Earle's contribution of a small phial, containing roots of the double flowering convolvulus were found rotten on opening the bottle on the 6th February last.

Mr. W. G. Frith's presentation of fifty Arum Bulbs were received on the 13th February in good order.

Mr. R. J. Hollingwood's contribution of thirty-two kinds of seeds, without name, including maize, beans, cucurbitaceous and other kinds of seed from the Sandwich Islands, were received on the 14th, and sown on the 18th February, and have nearly all germinated.

Mr. C. B. Stewart's presentation of ten Australian plants were received on the 4th instant in general good condition.

The twenty-four kinds of seeds received from Mr. Fortune, China, have been sown, and the accompanying statement will show the number and condition of the plants contained in the four glazed cases received on the 6th instant, also from Mr. Fortune.

In conclusion, I may here add that the Victoria Regia plant has produced two fully expanded flowers since the date of my last report, and that the size of the leaves and healthy green colours of the foliage are increasing daily with the warm weather.

Mr. B. Warwick's proposal, brought forward at the last Meeting for a fourth Flower Show, to be held in the Town Hall on the 7th April, was then submitted to the Meeting and carried.

Report from the Nursery Garden Committee.

The following Report was then read :—

Proceedings of a Meeting of the Garden Committee, held at the Garden on Wednesday, the 23rd of February, 1854.

Present.—Messrs. W. G. Rose, Stewart Douglas, and A. H. Blechynden, Secretary.

The Committee having inspected the Garden generally, agreed to recommend that the following works be undertaken before the next rainy season, the same being deemed very desirable :—

1st. That the piece of ground measuring about 325 feet by 150 feet on the west side of the peach plot be under-drained, similarly to the peach plot, which was under-drained in the early part of 1853, and has been found to answer the purpose so admirably of carrying off the surface water during the rainy season. The Gardener states, that if this work were commenced in March, it could be completed at leisure by the establishment before the setting in of the rains. This piece of ground has already some valuable grafts on it, and it could be appropriated for planting out the peach grafts expected from Saharunpore and Champarun ; and for other good peach grafts, raised from China stock, at present in pots. The few mango grafts, now on the ground, can be removed to another part of the garden.

2nd. That the walk between the old and new cutcha conservatories be widened about three or four feet ; this will give the walk a more sightly appearance, and admit of pot plants being placed on each side.

3rd. That the barrel built drain leading out of the tank at the north end of the pea ground be increased by twenty-four feet, to admit of a free passage of water to the westward, which during the rainy season lies on the ground to the injury of the crops in the vicinity.

4th. That another barrel drain of twenty-seven feet in length be built through the ditch at the western boundary of the Garden. This will not only be useful for carrying off the water in that direction, but will prevent the people making a path through that portion of the ditch which has been broken down by the rains.

5th. That a good bottom foundation be given to the new vine border contiguous to the out-offices of the Gardener's house.

The following is copy of an estimate furnished by the Gardener of the cost of carrying out the above improvements :—

30,000 bricks for making 15 drains in the plot of ground at Rs. 5⅌ 1,000, ... Rs.	150	0
2,000 bricks for bottoming the vine border and widening the walk at 5 Rupees ⅌ 1,000, ...	10	0
1,000 bricks for building the two barrel drains, ...	5	0
3 mds. of lime for the same at 8 annas ⅌ md., ...	1	8
8 mds. of Soorky at 3 annas ⅌ md, ...	1	8
Labour of masons, ...	5	0
Total Co.'s Rs.,............	173	0

The Committee are of opinion that the quantity of bricks required for the two barrel drains, will exceed the number mentioned in the above estimate, and would therefore recommend that a sum, not exceeding two hundred rupees, be granted for the above work. The Committee have further to suggest that the Secretary be requested, while in England, to procure the following articles for the Garden :--250 bell glasses of sizes for striking cuttings. These are much required, the present stock amounting to twelve only, and there is a difficulty in obtaining such glasses in Calcutta, at any cost. 2,000 cast iron tallies, for numbering and naming plants ; and as much galvanised wire as will enclose at least two acres of the Garden, on which to raise such crops as are now invariably destroyed by hares and jackals.

The Committee are unable to say what the cost of the above articles will be ; but they would recommend that, for the present, a remittance of, say £30, at 6 months' sight, be made on account to the Society's London Agents Messrs. Grindlay and Co.

(Signed) Wm. G. Rose.
„ S. Douglas.

Resolved that the outlay recommended by the Committee be granted, with the exception of the proposed remittance to Messrs. Grindlay and Co., respecting which, that it be referred to the next meeting for further consideration, and that in the interim further enquiry be made as to the probable cost of the proposed galvanized wire fencing.

Communications on various subjects.

The following letters were then read :

1. From Baboo Nobo Gopal Mullick, Bhowaniepore, acknowledging receipt

of ten copies of the *Indian Agricultural Miscellany*, and reporting the distribution amongst certain native gentlemen in his neighbourhood.

2. From Dr. W. Jameson, Saharunpore, dated 15th February, acknowledging receipt of Bank Bills for Rs. 154, towards payment of peach and nectarine grafts for the Society.

3. From the same, dated 21st February, advising dispatch of eight cases containing 269 peach trees, and eighteen nectarine grafts *viá* Meerut and Allahabad to Calcutta, for the Society.

4. From C. P. Carmichael, Esq., Officiating Assistant Secretary to Government, N. W. P., stating that the necessary orders had been forwarded to the Post Master General, N. W. P., for the free transmission of the eight cases of grafts referred to in the last-named letter.

5. From A. H. Blechynden, Esq., Secretary of the House Committee of the Metcalfe Hall, submitting the following extract of proceedings of the Committee held on Wednesday, the 22nd February.

First.—Read a letter from Baboo Modoosoodun Roy, dated 13th February, offering to make certain petty repairs to the Metcalfe Hall premises, for one year certain, for Co.'s Rupees forty.

Resolved.—To recommend that the above offer be accepted, commencing from the 15th March, on the following conditions:

1st. That the roof of the building be kept water-tight and free from vegetation.

2nd. That all the wood work be kept free of white ants.

3rd. That all petty repairs, such as replastering, small breakages of plaster, &c., be attended to.

4th. That a monthly inspection of the building outside and inside be made by Baboo Modoosoodun Roy, and a report on the same furnished monthly to the Secretary for the information of the Committee.

Second.—The Secretary having reported that the durwan of the Western gate had left service to proceed to his country, it was agreed not to engage another man in his place, and that the Northern gate durwan be directed to attend in future to both gates.

Third.—The Secretary having reported his intention of proceeding to England in the early part of next month, it was resolved that Baboo Peary Chand Mittra be requested to act as Secretary during Mr. Blechynden's absence.

Resolved.—That Baboo Modoosoodun Roy's tender be accepted with reference to the half portion of expense for repairs to the Metcalfe Hall, payable by the Society.

6. From G. Cooper, Esq., Under-Secretary to the Government, forwarding extract from a letter from Mr. R. Fortune, dated 30th December, 1853, stating that in compliance with the wishes of Government he is making extensive collections for the Society.

7. From Col. F. Jenkins, dated Gowhatti, 25th February, promising to lose no time in forwarding some further supplies of Cotton expected from Major Hannay, but which had not yet reached him.

8. From Lieut. W. H. Lowther, Meerut, a paper of suggestions for constructing a cheap and effective plant-house. Referred to the Committee of Papers.

9. From Messrs. Smith, Elder and Co., dated 3rd January, acknowledging receipt of a remittance of £100, on account of the Society.

10. From the same, dated 19th January, submitting their account of the past half year, which shews a balance of £14-9-2 in favor of the Society.

11. From Messrs. P. Lawson and Son, Edinburgh, acknowledging receipt of £88-16-10 from Messrs. Smith, Elder and Co., and suggesting some arrangements for despatching and purchasing seeds for the Society in larger parcels than hitherto. This suggestion was referred to the Garden Committee.

A petition from Sheraz, Bill Peon, was then submitted, applying for an increase of pay, in consideration of his long and faithful services to the Society for upwards of 20 years. It was accompanied by a recommendation from the Finance Committee that his pay be raised from the present rate of seven Sa. Rs. to Co.'s Rs. nine per mensem, viz. eight Rs. as the pay, and an extra rupee as personal allowance in consideration of his long services. Resolved that the recommendation of the Finance Committee be confirmed.

S. H. Robinson,
Acting-Secretary.

(Saturday, the 8th April, 1854.*)*

Baboo Gobinchunder Sen, Vice-President, in the chair.

The proceedings of the last General Meeting were read and confirmed, and the following gentlemen, who were proposed on that occasion, were duly elected members :—

Messrs. J. Finch; D. Simpson; T. J. Watson; W. Stewart; and H. Deverell.

The recommendation of the Council submitted to the General Meeting of the 11th February that "Mr. Wm. Storm be elected an Honorary Member in consideration of services rendered to the Society," was then brought forward for disposal, and confirmed.

The names of the following gentlemen were submitted as desirous of joining the Society :—

Dr. R. Lyell, Civil Assistant Surgeon, Ghazeepore,—proposed by Mr. R. B. Garrett, seconded by Mr. G. G. Mercer.

His Highness Ishore Persaud Nawam Singh Bahadoor, Rajah of Benares,—proposed by Lieutenant-Colonel J. T. Lane, seconded by Baboo Peary Chand Mittra.

H. Caspersz, Esq., H. C. Mint, Calcutta,—proposed by Mr. W. L. Harwood, seconded by Mr. W. G. Rose.

W. G. Campion, Esq ,—proposed by Baboo Gobinchunder Sen, seconded by Mr. W. G. Rose.

Presentations.

The following contributions were announced :—

1. Three packets of Malta Cotton seed. *Presented by H. Piddington, Esq.*

Referred to the Cotton Committee for instructions as to their distribution.

2. From C. Gubbins, Esq., C. S., Bijnore, two samples of cotton, one from common country seed, the other from two years' old Meerut plants.

Referred to the same Committee for report.

3. From Captain James, a copy of his pamphlet on " Gas in Calcutta."

4. From R. Nicholson, Esq., a small quantity of wheat taken from a field containing about five beegahs, all of which had been blighted by lightning, or some other cause.

5. A case of plants from Mr. R. Fortune.

The following is his letter accompanying the above, dated Hong Kong, March 14 :—

" On the 14th of February, I had the pleasure to send you a Bill of lading for four cases of plants and seeds collected by me for the Agri-Horticultural Society of India. To-day I beg to enclose you another bill of lading for a case shipped on the Steamer *Shanghai* advertised to sail on the 15th instant.

" The list which I inclose will give you information as to the contents of the case, which I hope will reach you in good condition. I beg to draw your attention, more particularly, to the *Rice Paper plant* (No. 3) which is a species of great interest.

" I had the honor to receive your letter dated February 18th, acknowledging the receipt of the box of seeds (No. 2), and I am glad to hear they reached you in good order. It will afford me much gratification if you will send me a report upon the state of each consignment, and any hints which you may consider necessary for my guidance shall have my best attention.

" In laying this communication before the Society, I beg you will assure the Council and Members of my earnest desire to assist them in conferring a great and lasting benefit on the people of India."

6. Some seeds of the Nuggussur or Nukussur trees. *Presented by Baboo Peary Chand Mittra.*

7. Eight cases containing Peach and Nectarine Grafts, from Dr. W. Jameson, Saharunpore.

8. From the Society's Garden, a large quantity of Bean and Pea seeds, of sorts, and three kinds of American acclimated Maize.

9. Journal of the Indian Archipelago. *Presented by the Government of Bengal.*

10. From J. G. Fischer, Esq., a quantity of seed of the Nerium tinctorium.

11. From the Asiatic Society, its Journal No. 1. for 1854.

Horti-Floricultural Exhibitions.

Read the following reports of the Judges on the show of vegetables, fruits and flowers, held in the Auckland Circus, on the 14th March, 1854.

In submitting the annexed list of prizes at the third Horticultural Exhibition of 1854, the Judges remark :—

" With respect to the vegetables, the asparagus and globe artichokes were abundant and well grown ; the latter were particularly large and fine compared with former shows.

Of cabbages there were six kinds brought forward, viz :—sugar loaf, early York, Battersea, Savoy, drumhead and red. The whole of these were abundant as usual, and of excellent quality, more especially the Savoy and sugar loaf kinds.

Two kinds of Scotch kale were represented in better condition than on any other previous occasion : the heads of these were large, green, and well curled.

The early white and sulphur broccoli were shown in abundance, and of fair quality.

Of nole kole the purple and white kinds were exhibited in numerous basket-fulls and in capital condition for table use.

Four kinds of beans were placed on the table, viz : Dwarf, French, Lima long pod, and Windsor. The two former kinds were plentiful, young and tender, and the two latter more abundant and the pods better filled than is usually the case.

The display of leeks of 1852-53 sowings was exhibited in good order, and the seedling onions, and other kinds raised from off-sets, were well represented.

Of lettuces four kinds were brought forward, viz: brown Dutch, Parish Cos, cabbage, and black seeded Cos ; the whole of these were plentiful, tender and well blanched, also the green-curled broad-leaved endive were plentiful, well blanched, large and tender.

The flat squash was shown but poorly on this occasion.

The Altringham, short horn, large red, white, black, and orange carrots were very abundant and well grown ; the two first named are the best for table use, and the latter more suitable for feeding cattle.

Of beet-root, the long red and turnip-rooted were shown in abundance and well grown, but the greater part had lost the colour from cuts and bruises. Mangel-Wurzel was also shewn of a very large size, and of capital quality.

Of potatoes four kinds were brought forward, one of which is new to the shows this season ; it was a full-eyed kind, with smooth red skin, and an oval shape; this appears to be an early kind. The second was the common early smooth skin and full-eyed sort of the bazar, which only retains its good qualities while young. The third and fourth kinds were very abundant and well grown ; these are distinguished from the two first named by their deep set eyes and rough skin, which peculiarities always denote the best keeping potatoes.

The white, flat, and yellow stone turnips were equally as fine as those brought forward at the February show, and the white globe and Swedish kinds were more abundant and just as good.

A small quantity of horse-radish was shown of pretty good quality.

The collections of six kinds of English pot-herbs were of a nice green colour, and well grown.

The curled parsley, turnip-rooted and long red radishes were abundant, and of excellent description.

Several baskets of marrowfat, sugar, and Prussian blue peas well represented this vegetable, considering the late period of the year.

The red and white seeding celery were more abundant on this occasion than is commonly the case, and showed an improvement in size and quality. Celery raised from off-sets was also shown of a large size, but hollow stocks.

The collection of Native vegetables, including beans, yams, maize and ginger, &c., &c., were shown in abundance, and of very good quality.

In the fruit department, sapotas, pineapples and guavas were shown in abundance and of excellent quality.

The bale, pomegranate, and loquat, were plentiful, and of large size.

Three kinds of limes, and three of China country oranges, were brought forward. The competition in pumplenose, papya, plantain, plum, rose-apple, jamrool and cocoanuts was very spirited.

A few pots of strawberry plants were placed on the tables, bearing ripe and well flavoured fruit.

Green mangoes and half ripe peaches were also brought forward of a large size for so early a period of the season.

A few splendid large and well flavoured apples from Mr. William Moran's garden in Tirhoot were placed on the table.

One small basket full of the aumlokee, or *emblica-officinalis,* was brought forward on this occasion. Altogether the Show may be considered good, and the competition spirited.

(Signed) Wm. G. Rose,
„ S. Douglas,
Peary Chand Mittra.

Floricultural.—In common with the two previous shows of the present season, the Judges have to report a falling off in this, the third flower show, as compared with the corresponding ones of 1852 and 1853. This general inferiority probably arises from some unfavorable peculiarity of the season, added to the very general failure of the last flower seeds distributed by the Society.

The sweet williams and amaryllids were well represented, but no other classes were deserving of especial notice *as collections.*

Some good *specimens* were, however, exhibited, more especially amongst larkspurs and stocks, and a few good orchids, amongst which two specimens of phalœnopsis amabilis, and vanda gigantia, from the Hon'ble Co.'s Botanic Garden, were much admired.

A good healthy specimen of cobœa scandens in flower, raised from seed was almost the only novelty exhibited. Of 260 Rs. set apart for prizes only 79 Rs. were distributed as per annexed statement.

(Signed) R. M. Thomas,
" A. Grote,
" Benjamin Warwick.

Reports.

The Gardener's monthly statement was then read. Mr. McMurray reports that the pea crop of 1853-54 has, in comparison with the former seasons, nearly doubled the percentage. This is owing to the trenching and top dressing the ground received; in every other respect the cultivation was as usual.

No degeneracy has taken place in the quality of seed, although the same kind of crop has been grown on the same plot of ground for five years.

Although the hail storm on the night of the 22nd March, damaged the young peach fruit considerably, an abundant crop still remains on the trees in capital condition. The mangoes also sustained great damage from the same shower. Of the twenty-four kinds of seeds received from Mr. Fortune, seventeen he states have germinated freely, and among them the *green-dye.* The plants sent by Mr. Fortune arrived in good health. The nectarine and peach grafts sent by Dr. Jameson were received in good condition, but as no labels were put on the cases, it is impossible to distinguish them yet. "In conclusion," Mr. McMurray states, "I have to report from Mr. A. Scott a presentation of nine cart loads of bone charcoal dust from his sugar mill at Sibpore, and I find it a useful manure for pot plants and top dressing the ground."

The report from the Nursery Garden Committee read at the last General Meeting was then brought forward, and the recommendation of the Council "that £30 be forwarded to Messrs. Grindlay and Co., to meet the expense of bell-glasses, &c.," was confirmed.

Notices of Motion.

Mr. G. C. Mercer, then brought forward the following proposals :—

1. That from the present time all Members old or new pay the quarterly sum of 6 Rs. or 24 Rs. annually.

2. That the sum for a life membership be reduced from 400 Rs. to 300 Rs.

3. That all Members of 25 years' standing, who have paid up their subscriptions, be free Members, and so become from their long standing life Members.

4. That all Members who are at present on the List, on their attaining the lengthened period of 20 years' standing, become free or life Members.

5. That in future the Finance Committee, or any other Meeting, when the subject of our Funds is concerned, be restricted from disbursing such large sums as 3 to 4,000 Rs. without the especial votes of the entire association of resident and Mofussil Members.

After some discussion this last proposition was withdrawn by Mr. Mercer, and it was resolved that the other four be submitted to the Council.

Communications on various subjects.

The following communications were then read :—

1. From Baboo Kissory Chand Mittra, Deputy-Magistrate Jehanabad, accompanying a list of persons to whom he had distributed Vol. VIII, Part 3, of the Indian Agricultural Miscellany.

2. From F. A. Glover, Esq., Mooteeharee, intimating that the peach grafts he promised the Society are now ready; but suggesting they should not be forwarded to Calcutta until after the first fall of rain, or about the end of June.

Resolved.—That Mr. Glover's suggestion be acted upon.

3. From Hodgson Pratt, Esq., Under-Secretary Government of Bengal, annexing copy of the following Notification :—

"The Most Noble the Governor of Bengal has been pleased, in accordance with the recommendation of the Agricultural and Horticultural Society of India, to determine that the gratuitous distribution of plants and seeds from the Hon'ble Company's Botanic Gardens shall from and after the 1st of April 1857, cease, except in special cases, and on purely public grounds."

4. From C. Horne, Esq., Bareilly, intimating that he is organizing a public garden at that station, and requesting supplies of cereals and other seeds, also suggesting that a copy of the Society's Transactions should be presented to the garden.

Resolved.—That the Bareilly Gardens be presented with any numbers of the Society's Transactions of which there are numerous spare copies, also that

Mr. Horne should be supplied with a further quantity of such seeds as he may require, beyond his share as a subscriber, at a low cost.

5. From G. Couper, Esq., Under-Secretary to Government, forwarding extract of a further communication from Mr. Fortune, advising despatch of a case of Chinese plants for the Society.

(*Saturday, the* 20*th May*, 1854.)

The Honorable Sir Lawrence Peel, President, in the chair.

The proceedings of the last General Meeting were read and confirmed.

The following gentlemen who were proposed at the last General Meeting were elected Members :—

Dr. R. Lyell, H. H. Ishore Persaud Nirvam Sing Bahadoor, Rajah of Benares, and Messrs. H. Caspersz and W. G. Campion.

The names of the following gentlemen were submitted as desirous of joining the Society :—

Khajee Abdool Guffar, Dacca,—proposed by Mr. W. G. Rose, seconded by Baboo Peary Chand Mittra.

Dr. McLean, Assistant-Surgeon, Debrooghur,—proposed by the Rev. E. Higgs, seconded by Mr. W. G. Rose.

Lieut.-Col. R. Horsford, Commanding Artillery, Cawnpore,—proposed by Major R. Houghton, seconded by Mr. W. Earle.

H. Wright, Esq., C. S., Shapoor,—proposed by Captain G. E. Hollings, seconded by Mr. W. G. Rose.

Brigadier P. F. Storey, C. B.,—proposed by Mr. C. A. Cantor, seconded by Mr. W. G. Rose.

F. Schiller, Esq., Merchant,—proposed by Mr. C. A. Cantor, seconded by Mr. W. Earle.

Presentations.

The following contributions were announced :—

1. From S. F. Seymour, Esq., a plant of the *Sansiviera Zeylanica*, with some of its fibre.

2. From Dr. J., McClelland, Pegu, five samples of Pegu rice.

3. From W. Earle, Esq., three samples of Arracan paddy, respecting which Mr. Earle writes as follows :—

"They were both brought up, the 19th instant, from Rangoon by Mr. Ford of the *Berenice*, who kindly procured them for us, from Mr. R. Hannay of that place. Mr. Ford considers them the produce of Arracan, though possibly they may be from the Bassein district. But, be that as it may, No. 1. deep yellow color, is precisely like the very best Arracan I have seen at home, and is a beautiful sample of well grown paddy, being bold, clean, and *remarkably heavy*. No. 2. olive color, with short winglets, resembles the sample No. 5 of Dr. McClelland, (five musters, Nos. 1 to 5, sent up by him to the Society recently from Pegu, without any particulars,) but speaking from recollection, I do not think it is so fine as this sample. The latter has also much longer winglets adhering to the grain.

"Further, the No. 2 is somewhat like the *Baro dhan* sown here on the borders of jheels, after rains, ripening in about three months, I believe; but the latter is of a darker color and lighter grain, and I should think, inferior to No. 2.

"The No. 1. seems a more valuable rice than No. 2, but both are worthy of trial here, and I hope that Baboo Peary Chand Mittra, will kindly undertake to sow the greater portion of the samples, and report the results to the Society."

4. *From J. H. Prinsep, Esq., a sample of cotton from acclimated American seed.*

5. From C. J. Simons, Esq., Assam, a case of orchids, moss, and Nepenthes plants, sixty-five in all.

6. From Captain G. E. Hollings, Goruckpore, samples of cotton and thread from acclimated American seed.

Captain Hollings, in his letter referring to these specimens, writes :—

"I have despatched to your address two seers of cotton, and one seer of thread from the American seed acclimated at Leia and grown here. The heat which at times was excessive did not affect the growth of the plants, and the produce was as great and as good as expected. The thread was made by the prisoners in the jail—the cotton was also separated from the seed by them in the *charkas* used in this part of the world. Other things being equal, there cannot be a doubt of the superiority of the produce from the American seed; there would doubtless be great improvement in that from indigenous seed, if the cultivation was more attended to."

7. From A. Grote, Esq., Officiating Secretary Board of Revenue, a box containing samples of various productions from Major Hannay's farm at Debrooghur.

8. From Lieut. F. W. Ripley, Akyab, seeds of millet, and a kind of long grass called by the Burmese *Gyet-Thee,* from the flour of which excellent bread is made by the natives of Arracan.

9. From the Government of Bengal, Selections from its Records, No. 14, two copies.

10. From A. Grote, Esq., Secretary Asiatic Society, a box of gums from Swan River, belonging to Mr. R. M. Stephenson, E. I. Railway Company, at whose request they are forwarded to this Society.

11. A number of peaches of the Lucknow, Sultany, Butler, Shanghae and Drop varieties, from the Society's Garden, were placed on the table. Also a few bunches of grapes from the vines in the compound of the Metcalfe Hall.

Floricultural Exhibition.

Read the following report of the Judges at the show of flowers held in the Town Hall, on the 7th April, 1854.

On the fourth Floricultural Show of 1854, held at the Town Hall on the 7th April, the Judges have to report as follows:—

"There was a good show of plants on this occasion, notwithstanding the advanced period of the season, and though the collections were not large in number, the quality of the flowers produced was on the whole above the average.

"The show of orchids was the best of the season, and perhaps equal to that of any former year. There was a good show of Amaryllids also, and a fair representation of Asters and Cinerarias.

"Amongst *Onagraceæ* there were several specimens of the delicate white flower *Gaura Lindheimeria,* to which, being a novelty at the shows, a prize was awarded, though not included in the prize lists.

"The Hall was well attended by visitors, and of about twenty contributors to the show, fifteen obtained prizes to the amount of 103 Rs., which were distributed by the Vice-President, Rajah Pertab Chunder Sing."

(Signed) R. M. THOMAS,
„ BENJ. WARWICK,
„ A. GROTE.

The Gardener's monthly statement was then read :—

"In drawing up my report for the month of April last, it will no doubt be gratifying to the Society to learn that 144 Vanilla fruit are set on four of the young plants growing against the large almond tree at the eastern communication between the orchard and flower garden. The largest of these is at the present time rather more than eight inches in length and two inches in circumference, which, in comparison with the largest yielded by the same plant last year, shows an increase in length of two and a half inches. The American apple trees have already made good growth this spring, and are now in full flower. Four of the Avocado pear trees have flowered this season for the first time, and have set a few fruit. The several kinds of pine-apple plants now under different modes of cultivation in the garden—some of them being fully exposed to the rays of the whole day's sun, while more are partially, and a few wholly under the shade of trees,—are doing well, and have set a few fruit. The flowering of the *Gloxinea maculata,* in a great measure depends on the cultivation given to the plant at this season of the year, which ought to be as follows, viz.: when the plants or tubers have started into growth, turn the whole out of the pot, and carefully separate each tuber without breaking them, then pot each singly into a rather smaller pot, and as the plant advances in size, shift it again into a larger pot, which should be well washed and drained with pot sheds; over the pot sheds spread a little moss or half decayed leaf mould, to prevent the compost from mixing with the drainage. This compost should be composed of equal parts of well decayed leaf mould, peat, and sand, the whole should be well mixed together, and broken fine before using. After potting, place the plants in the shade, and water gently from above for a few days, after which a good supply of water will be daily required by the plant to enforce a healthy growth. I have been induced to offer the above remarks on the treatment of this plant from the number that have been distributed from the garden during last year to many who may not be informed of the proper mode of their culture.

"The cropping of the Garden is nearly finished for this season with jute, *duncha*, Jubbulpore hemp, *Sida rhomboidea*, and acclimated American maize corn, together with a number of other kinds of small seeds.

"In conclusion, I have to add that the *Victoria regia* has again commenced to flower in the tank at the West side of the Rosery. Three flowers have been already fully expanded by the plant during the last ten days, and the fourth flower will be open to-morrow night. The new Water Lily, *Nelumbium luteum*, is throwing out fine large leaves, and may be expected to flower in a short time."

Notice of Motion.

Notice was given by Mr. W. G Rose, of the following proposal to be brought forward at the next General Meeting, it having been already approved by the Council :—

"That our Secretary, Mr. Blechynden, having proceeded to Europe for the benefit of his health, the sum of £40 sterling be remitted to him, to enable him to visit some of the principal gardens in Great Britain and France, with the view of his acquiring information, for the benefit of this Society, regarding the most important recent improvements in horticulture, and that the above sum be only devoted to pay the expences of his travelling in those places on the business here assigned to him by this Society."

Communications on various subjects.

1. From E. Solly, Esq., London, requesting the Society would aid him in collecting specimens of animal productions towards the formation of a General Museum of animal produce, which he is forming under the joint authority of the Royal Commissioners for the Great Exhibition of 1851 and the Society of Arts.

The Acting-Secretary submitted a list of a few specimens of silks, &c., in the Society's Museum, of which portions could be spared, and it was resolved that these be sent to Mr. Solly, provided in doing so the Society incurred no expense.

2. From W. G. Young, Esq., Under-Secretary to the Government of Bengal, forwarding an extract from Mr. Fortune's letter, dated 14th March, 1854.

3. From the same, forwarding for the information of the Society, copy of a despatch from the Hon'ble the Court of Directors, with its enclosed report by Dr. Royle, on the subject of the "Bast" produced in the province of Arracan. Referred to the Committee of Papers.

4. From W. Earle, Esq., stating that he had made over portions of the China rice sent by Mr. Fortune, to Baboo Rajkissen Soor, in charge of the Moyapore Magazine, on condition of his furnishing a full report of the treatment and results for the information of the Society.

5. From C. Horne, Esq., Bareilly, requesting the assistance of the Society in procuring some wheat and barley seed for him for the public garden he is organizing there.

The Acting-Secretary stated that he had circulated Mr. Horne's letter to the Members of the Grain Committee, soliciting their advice, and, according to their suggestions, he had written to parties in Monghyr and Jubbulpore, and that the Overseer of the School of Industry at the latter place had purchased five maunds of Nerbudda wheat, and Mr. Bean at Monghyr had kindly promised his assistance, and was now awaiting instructions to make the necessary purchases.

Resolved.—That Mr. Horne be written to for a remittance to carry out his wishes.

6. From the Rev. J. Long, regarding the number of boys he would wish to send to the Society's School, and how the expenses of their board would be defrayed.

The Acting-Secretary stated that the Council had referred this letter to the Garden Committee, under whose consideration the subject still remained.

7. From C. McDonald, Esq., Honorary Secretary Botanical Garden, Bhaugulpore, offering his best acknowledgments to the Society for the Chinese seeds sent him, of which the soap bean seeds had been destroyed by insects: the rest would have every attention.

8. From C. Beadon, Esq., presenting some papers on the practicability of supplying India with seed from the Seychelles, left with him by Mr. Lewis Jackson a short time since, and consisting of letters addressed to Mr. Jackson by the Colonial Secretary at Mauritius, and a report from Mr. Louys on the above-mentioned subject. Referred to the Committee of Papers.

9. From Captain G. E. Hollings, thanking the Society for the Chinese seeds, of which he would send some to Jhelum, where they were more likely to succeed.

10. From P. Carnegy, Esq., wishing to know on what terms he might have four times the quantity of seed to which he is entitled for the benefit of the Government Garden at Allahabad.

11. From Mr. J. Carter, London, regretting the failure of the last assortment of seeds, which he attributes to the transmission being too early in the season, or to their having been placed too near the engine in the steamer which conveyed them, and enclosing his receipt for £100 sent to him.

12. From Messrs. Grindlay and Co. acknowledging receipt of a Bank Bill for £75, which they have placed to the credit of the Society.

For all the above presentations and communications the best thanks of the Society were accorded.

It was suggested by some of the Members present that any valuable papers or communications of general interest that might come before the Society, should, after they have been submitted to, and approved by the General Meeting and Committee of Papers, be sent at once to the Calcutta Newspapers for gratuitous publication, if they would so receive them, in lieu of reserving them only for a tardy appearance in the Society's Journal. This suggestion was adopted by the Meeting.

(*Saturday, the* 17*th June,* 1854.)

The Hon'ble Sir Lawrence Peel, President, in the chair.

The proceedings of the last General Meeting were read and confirmed.

The following gentlemen, who were proposed at the last Meeting, were duly elected members:—

Khajee Abdool Guffar Saheb; Dr. McLean; Lieutenant-Colonel R. Horsford; Mr. H. Wright; Brigadier F. P. Story; and Mr. F. Schiller.

Motions.

The motion by Mr. W. G. Rose, of which notice was given at the last General Meeting, was then brought forward, and after some amendment was carried in the following form:—

That our Secretary, Mr. Blechynden, having proceeded to Europe for the benefit of his health, the sum of £40 sterling be remitted to him, to enable him to visit some of the principal gardens and farms in Great Britain, France, and other places, with a view of his acquiring information for the benefit of this Society regarding the most important recent improvements in Agriculture and Horticulture, with a special reference to the cultivation of flax and other fibres, and the mode of their preparation, and that the above sum be only devoted to pay the expenses of his travelling in those places on the business here assigned to him by this Society.

It was then proposed by Baboo Peary Chand Mittra, seconded by Baboo Gobind Chunder Sen, and carried:—

That Messrs. Rose, Haworth, Cantor, and Earle, be appointed as a Committee for drawing up special instructions so far as necessary to Mr. Blechynden for carrying out the objects of the above Resolution.

The Report of the Council on Mr. Mercer's proposals was then read as follows :—

"On reading the Report of the Finance Committee hereto annexed, the Council have to report that it is in their opinion inexpedient that either of Mr. Mercer's proposals should be carried out."

Report of the Finance Committee.

"The Finance Committee, after an inspection of the accounts of receipts and disbursements of the Society for the last three years, beg to report as follows :—

1st. That the average annual income for the three years 1851-52-53, was about Rs. 23,635, and the average annual expenditure for the same period was about Rs. 23,200, and the present number of members paying Rs. 8 per quarter is 499; consequently the proposed reduction to Rs. 6 per quarter would create a deficit of Rs. 3,992 per annum; and therefore it appears to the Finance Committee that unless it be agreed upon that the capital of the Society may be encroached upon for this purpose, it is not expedient to adopt Mr. Mercer's proposal to reduce the subscription to Rs. 6 per quarter, as in the opinion of this Committee it is very doubtful whether the proposed reduction of the subscription would bring to the Society such an accession of subscribers as would make up for the deficit above alluded to.

2nd. With respect to Mr. Mercer's second proposal, the Committee beg to report that during the period when the sum for purchase of a life Membership was 150 to 160 Rs. only—that is from 1835 to 1838, or three years—47 members availed of the privilege, averaging more than fifteen per annum; whereas from 1838 to 1853 the fifteen years during which the rate was increased to 400 Rs., only five members became life members by purchase.

3rd. and *4th.* With reference to the third and fourth proposals, the Committee beg to subjoin a tabular statement of 75 members, who would, if these proposals were adopted, become free life Members during the next five years, causing a diminution of income (at the rate of thirty-two Rs. per annum) of 2,446 Rs. annually at the end of that period, and an immediate diminution from next year on the subscriptions of 16 members of 512 Rs. per annum."

Proposed by Mr. W. Haworth, seconded by Mr. R. Morrell, and carried:

That the Report of the Council be received and adopted.

Candidates for Election.

The names of the following gentlemen were then submitted as desirous of joining the Society :—

Shah Kubeerodeen, of Sasseram,—proposed by Mr. A. Grote, seconded by Dr. H. Falconer.

C. S. Boileau, Esq., C. S., Etah,—proposed by Mr. R. H. S. Campbell, seconded by Mr. W. H. Elliot.

Captain James Travers, 2nd in command Bhopal Contingent,—proposed by Dr. G. Tranter, seconded by Captain F. W. Brodie.

Cornet W. Shakespeare, Madras Light Cavalry—proposed and seconded by the same gentlemen.

A. Skinner, Esq., Hansi,—proposed by Dr. D. Scott, seconded by Mr. J. Ross.

Report.

The Gardener's Monthly Report for May was then read. Mr. McMurray states :—

" In the preparation of my Report for the month of May last, I have first to state for the information of the members and others, that I have now twelve hundred (1,200) Mango grafts of eighteen kinds, and two hundred and fifty (250) Peach grafts of thirteen sorts, besides a number of other fruit trees ready for delivery (at the reduced scale of prices) during the present issue season ; also three or four hundred musa (or plantain) plants of the following varieties will be available, viz. : Dacca, Chumpa, Martaban, and the Cavandishii. The three former kinds are becoming too crowded together to bear either large or good fruit. The Assam grass cloth, and tapioca plants may also be made available in large numbers. The Cabool and China walnut trees, presented to the Society by Major R. Ouseley and Arbuthnot Emerson, Esq., in August and September last, have made a good growth since that time where they are planted out, in an open plot in the orchard. The Manilla hemp plant, *Musa textilis*, contributed to the Society by Geo. Ackland, Esq., in August last, is now well established in the ground, and is beginning to send up suckers, which will be propagated from as soon as possible.

" The glazed case of orchid and pitcher plants from Mr. Simons, Assam, in exchange for fruit trees, was received on the 18th May, 1854.

" Mr. R. Blechynden's presentation of eight kinds of aloe, in all fourteen plants, were received on the 24th May last in pretty good condition.

" Mr. C. B. Stewart's contribution of two plants of *Nepenthes Sp.* from Penang were received on the 10th May last, in very good order.

" In conclusion, I have to state that the Victoria Regia plant, grown in the tank at the west side of the Rosery, has now seven leaves above the water, the largest of which is this morning three feet two and a half inches diameter, and which is increasing daily."

Presentations.

1. From the Asiatic Society, its Journal No. II, of 1854.
2. From R. McDonald Stephenson, Esq., through Messrs. Willis and Earle, a basket of Ceylon Sapan wood seed.

3. From Dr. McClelland, through the same—six samples of Pegu rice. The following is a copy of Dr. McClelland's letter to Mr. Earle on the subject of the seed paddy sent by him :—

"I send you, by the *Fire Queen,* addressed to the Agri-Horticultural Society, five samples of rice obtained from the bazar of this place.

One of the samples which I sent you before, and which I obtained at '*Yin dike quin*' in the line district, where it is cultivated, is not procurable at present in the Rangoon market.

You will know the kind I allude to which is the largest grain of all, with two singular looking bracts or glumes at the base of each grain. The Burmese name is *Ebea.* It is sown in June in the usual way and kind of ground, and is reaped in January.

The sample of small grained rice I now send, and which is not in the first samples, called '*Cha dha,*' is important from the fact of its ripening within three months of the date of sowing, for which purpose it requires to be transplanted into dry ground in the month of July. You will find a slip of paper in the bag with each sample, giving all the information I have been able to collect on the subject.

I like Burmah very much ; the climate is decidedly cooler than Bengal, the thermometer since the 16th instant, when the rains set in, has not been higher than 84 deg. or 86 deg., and at night all the year round it is cool. The rains fall in heavy showers, but are not incessant for days as in Calcutta. We have more cloudy weather during the rains than you have, without a much heavier fall, considering they begin earlier and last longer than they do in Bengal."

4. From H. Cope, Esq. Secretary of the Agricultural and Horticultural Society, Punjab--Sample of flax grown in the Society's Garden.

The sample has been referred to the Flax Committee.

5. From Mrs. Sturmer—two fig-tree plants and samples of the fruit, from the tree of the same kind.

Communications on various subjects.

1. From Major F. Hannay, Dibrooghur,—acknowledging the receipt of the Chinese and cotton seeds sent him, and promising a report in due time.

2. From J. H. Prinsep, Esq., Buttala,-states that No. 11 of the Chinese seeds sent him has germinated, and requests to have some information regarding the time of sowing the green indigo and hemp seeds.

3. From Mr. J. Carter, London,—encloses his receipt for £151-18 paid him, and promises to make up for the disappointment caused last year by the failure of the seed, by supplying them this year at the same rate, although they are scarcer and dearer.

4. From Messrs Smith, Elder and Co.,—acknowledging receipt of a bill for £25, which they have placed to the credit of the Society.

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5. From Lieut. J. DeC. Sinclair,—offers to send some orchids and lilies that grow wild in the Chickulda Hills for the Society's garden, and applying for a packet of Chinese seeds, as he thinks they will succeed there.

Resolved that Lieut. Sinclair be written to, to ascertain the expense of sending down a case of the plants to Calcutta.

6. From the Secretary to the Local Committee, Baraset,—Report on the progress of the Agricultural class of the pupils in the Baraset School.

For all the above communications and presentations the best thanks of the Society were accorded.

(*Saturday, the 8th July,* 1854.)

The Hon'ble Sir Lawrence Peel, President, in the chair.

The proceedings of the last Monthly Meeting were read and confirmed, and the gentlemen who were proposed on that occasion were duly elected :—

Shah Kubeerodeen, Mr. C. E. Boileau, Captain James Travers, Cornet W. Shakespeare, and Mr. A. Skinner.

The names of the following gentlemen were submitted as desirous of joining the Society :—

Lieutenants E. K. O. Gilbert and E. V. Utterson,—proposed by Captain G. L. Cooper, and seconded by Mr. W. G. Rose.

C. B. Stewart, Esq.,—proposed by Mr. W. G. Rose, seconded by Mr. C. A. Cantor.

Capt. P. Salis,—proposed by Mr. W. G. Rose, seconded by Mr. W. Earle.

Lieut. W. S. Row and G. Rogers, Esq.,—proposed by Mr. W. G. Rose, seconded by Mr. W. Earle.

Capt. F. C. Jackson,—proposed by Mr. R. B. Garrett, seconded by Mr. W. G. Rose.

Capt. I. Campbell,—proposed by Brigadier J. Johnstone, seconded by Mr. W. G. Rose.

J. Agabeg, Esq.,—proposed by Baboo Peary Chand Mittra, seconded by Mr. W. G. Rose.

D. C. Mackey, Esq.,—proposed by Mr. F. Bellairs, seconded by Mr. W. G. Rose.

Presentations.

The following presentations were announced :

1. From A. T. T. Peterson, Esq., a bundle of Rheea fibre sticks, grown at his farm at Baraset.

2. From the Government of Bengal, through W. G. Young, Esq., Officiating Under-Secretary, a sample of Russian bast mat.

3. From S. F. Seymour, Esq., a specimen of Burmese rope.

4. From the Chamber of Commerce, its Half-yearly Report for 1854.

5. From the Government of India, through G. Cooper, Esq., Under-Secretary, 20 printed copies of Dr. Royle's Report on the Rheea and Hemp of India.

The Acting-Secretary was requested by the Council to make out a list of such persons as were interested in the growth of fibres, among whom they might be distributed.

6. From the Asiatic Society of Bengal, its Journal No. 3 of 1854.

7. From the Hon'ble Sir Lawrence Peel, a packet of Hollihock seeds of choice sorts for the Society's Garden.

8. From Baboo Peary Chand Mittra, a paper on the *Indian Agricultural Miscellany*, to be published in the next number of the *Calcutta Review*.

Reports.

The Report of the Special Committee appointed to draw up instructions to Mr. Blechynden for carrying out the objects of Mr. Rose's motion passed at the last Meeting, and their letter of instructions to Mr. Blechynden, were then brought forward, supported by the recommendation of the Council, and read as follows:—

To A. H. BLECHYNDEN, ESQ.,
Secy. Agri. and Horti. Society of India, London.

Sir,—We beg to apprize you of our having been appointed by the last Monthly General Meeting of the Agricultural and Horticultural Society a Committee for drawing up special instructions, with a view to aid you in carrying out the objects of the following motion, which was passed at the June Meeting, viz:—

"That our Secretary, Mr. Blechynden, having proceeded to Europe for the benefit of his health, the sum of £40 sterling be remitted to him to enable him to visit some of the principal gardens and farms in Great Britain, France, and other places, with a view of his acquiring information for the benefit of this Society, regarding the most important recent improvements in Agriculture and Horticulture, with a special reference to the cultivation of Hemp, Flax, and other fibres, and the mode of their preparation, and that the above sum be only devoted to pay the expences of his travelling in those places on the business here assigned to him by this Society."

And in pursuance thereof we beg to advise you as follows:—

2. With respect to the selection of the Botanical and Nursery Gardens in Great Britain and France, which it may be advisable for you to visit with the object of acquiring useful information for our Society in mere Horticultural matters, we think that we cannot do better than leave this to your own good judgment, after you have consulted on the subject with Sir William Hooker, Dr. Royle, Professor Lindley, and any other eminent Botanists to whom you may hold letters of introduction.

3. You will no doubt be able to benefit the Society by consulting personally with Messrs. Carter and Company, of London, Messrs Lawson and Sons, of Edinburgh, and some others of the principal seedsmen in London, Paris and Ghent, as to the selection, cost, and forwarding of the future supplies of seeds for the Society, and we recommend you to do so.

4. We would next call your particular attention to the terms of the motion referring to the cultivation and preparation of Hemp, Flax, and any other valuable fibres now cultivated in, or imported into Great Britain, and we recommend you to endeavour to learn before you leave London the most likely places for seeing the cultivation of Flax, and its after preparation under the different improved processes which have of late years come so successfully into operation. As regards the cultivation of this plant, it would be desirable to make inquiries as to the most favorable kind of soils, the description, amount of tillage, and kind of manures used, whether draining is considered necessary, and to obtain samples of the most approved seed, also of the dried plant in the straw, and of the same after it has gone through various stages of its preparation, until it becomes marketable Flax, with a note of the cost of the processes ; to obtain samples of the most approved Flax and Hemp, and of any other valuable fibres now cultivated in or imported into Great Britain, with a report of their market value. It is desirable that by personal inspection you should acquaint yourself with the old process of preparing the Flax from the straw by rotting, also to see the same done by Mr. Schenck's warm water apparatus, but above all to acquaint yourself with Mr. Watt's process of effecting the same preparation by high-pressure steam. To take notes of the apparatus employed, the quantity that could be prepared in a given time by a moderate sized apparatus, the cost of such, also the expence of converting a given quantity of Flax straw into a finished article.

It would also be very desirable for you to notice particularly the kind of machines, American and English, used in all the different processes for breaking and separating the woody matters from the fibre, and if you should consider any of them applicable to the preparation of Jute, Rheea, Maddar, Plantain, Aloe, and other fibres in this country, to possess yourself of such information respecting them and their cost, as would enable the Society hereafter to procure such if deemed necessary ; with the same view to obtain a list of the latest and best publications and reports, American and English, on the cultivation and preparation, and machines for the preparation of the hemp, flax, and other fibres, and the cost of the same. It would be well also to procure a small quantity of the best hemp and flax (Linseed) seed for the Society.

5. For the purpose of your prosecuting these enquiries effectually, we suggest the following places, which amongst others you might visit with advantage, viz., Belfast and the north of Ireland, where the Flax plant is

both highly cultivated and prepared to the greatest perfection, and it would be well to obtain an introduction to the Secretary of the Royal Flax Society, who no doubt would willingly give you the benefit of his knowledge, and a further introduction to such parties and places as to enable you to prosecute your enquiries with advantage.

In Glasgow you would, we believe, find Mr. Watts, the patentee of the latest improvement, in preparing flax by the high-pressure steam process. A letter to him, or to his Agents, before you commence your travels, stating your object, would probably obtain from him introduction to parties who have applied his process. At Leeds you would find some of the best Flax machine makers. Mr. Peter Fairbairn, for instance, who would also shew you through establishments there, manufacturing fibres from the coarsest sacking to the finest linen, but it is with the simple and light machinery used in the first preparation of fibres from the plant that requires your especial attention more than spinning and weaving machinery. In Belgium and at Courtrai, whence the finest Flax is obtained, you would have an opportunity of seeing the Flax grown under great care and attention, and also of seeing in use the old method of retting, as well as the hand machines so long and so much used in that country in its preparation, and it is probable that you would find their methods of working more suitable to the wants of this country than the more elaborate and scientific apparatus now so generally used in the North of Ireland.

6. We also beg to intimate to you our intention, before our Committee dissolves, of reporting to the Council of the Society our opinion that you will find the additional duties now assigned to you may probably require more of your time than your twelve months' leave of absence will admit of, as well as some further outlay for your travelling expences, and that we shall therefore recommend to the Society to grant you extension of leave of not exceeding three months, as well as such addition to the sum voted for your travelling allowance as you may find requisite, provided that the amount do not exceed £100 in all.

7. We feel satisfied that we may leave all other details to be regulated by your well known zeal for the interests and well doing of the Society.

We are, yours faithfully,
(Signed) Wm. Haworth.
" W. G. Rose.
" W. Earle.
June 29, 1854. " C. A. Cantor.

Report of the Committee appointed by the Monthly General Meeting of the Agricultural and Horticultural Society of the 17th June, 1854, for drawing up instructions to Mr. Blechynden as to the best mode of carrying out the wishes of the Society in remitting to him the sum £40 for his travelling expences :

"The Committee beg leave to lay before the Council herewith a copy c their letter of instruction to Mr. Blechynden, framed by them in compliance with the wishes of the Society.

*The Committee beg to call the attention of the Council to the circum*stance, that after the sum of £40 had been proposed for Mr. Blechynden's travelling expenses with the view of visiting the gardens of England and France, it was suggested at the above Meeting that it was quite as desirable that Mr. Blechynden should have the means also placed at his disposal to make enquiries into Agricultural improvements, but more especially as regarded the cultivation and preparation of Hemp and Flax, and other fibre-giving plants, and a resolution to this effect was carried. It was also mentioned at the Meeting that to carry out this extended mission the sum voted would be too little. The Committee, on due consideration of the matter, feel called upon to submit to the Society their unanimous opinion that to enable Mr. Blechynden to do justice to the instructions about to be forwarded to him, it is quite necessary that his leave of absence be extended, and the amount for his travelling expences increased.

To meet the first, the Committee recommend an extension of leave to be granted, not exceeding three months, in addition to the twelve months already allowed him.

And to cover the extra travelling expences, that a further sum of not exceeding £60 be granted, making with the £40 already passed £100, and this Committee venture to hope that their recommendation to this effect may be brought before the next Monthly General Meeting, supported by the approval of the Council."

(Signed) W. G. Rose.
" Willis Earle.
" Wm. Haworth.
" C. A. Cantor.

The Hon'ble President then gave notice of the following Resolution, to be brought forward for confirmation at the next General Meeting, viz.:—

"That the recommendation of the Special Committee, which has been approved by the Council, that Mr. Blechynden's leave of absence be extended for three months, and the sum placed at his disposal for travelling expences be increased to £100, be confirmed."

The following Resolution, submitted to the Meeting by the Council, was then read:—

"That the Society award a premium of Co.'s Rs. 1,000 for submitting to it on or before the 1st December, 1855, the most approved specimen of not less than 50 mds. of Rheea fibre, the whole to be the produce of the cultivation of the party tendering it, and 10 maunds of which to become the property of the Society, to be accompanied by a detailed statement of the process followed in its cultivation, and after preparation, and the cost of the same. The quality to be approved by the Society, and the Fibre to be in a fit condition for the English market."

Baboo Peary Chand Mitter then gave notice that he should move at the next Meeting that the above recommendation of the Council be adopted.

The recommendations of a Special Council Meeting, held on Friday, the 7th July, were then brought forward as follows :—

"The Society, having received by the last Mail the news of the death of the late Dr. Wallich, desire to place on record their deep sense of the valuable services rendered by him to the Society over a period of thirty-four years, during which he has been at different periods its Honorary Secretary, Vice-President, and Honorary Member, and their grateful acknowledgments for the services he has rendered to the cause of Horticulture and Agriculture in India."

The Hon'ble President, after dwelling at some length on the valuable services rendered to India and to this Society by the late Dr. Wallich, proposed that the Meeting should adopt the above Resolution. This was unanimously agreed to; and it was then moved by Mr. W. G. Rose and carried :—

"That a copy of the Resolution be forwarded to the Widow of the late Dr. Wallich."

At this stage of the proceedings the Hon'ble President vacated the chair, which was then taken by Rajah Pertab Chunder Sing, Vice-President.

The following report from the Council was then read :—

"The Council, in submitting to the next monthly general meeting of the Society, the letter from the Hon'ble Sir L. Peel, resigning his office of President of the Society, express their great regret at the loss the Society is likely soon to sustain in being deprived of his valuable services, and do recommend that a suitable address be presented to him at the proper time, and that he be now requested to sit for his portrait to remain as a memorial in the Society's Hall, and that the portrait be a full length one, and that for the purpose of carrying out this object a subscription be collected amongst the Members of the Society, and that the surplus of such subscription, if any, be applied to the purchase of Medals, to be styled Peel Medals, for prizes at the Society's horticultural shows."

Moved by Mr. W. Earle, and seconded by Mr. W. Blundell, and unanimously carried :—

"That this Meeting, fully entering into the sentiments of the Council on the occasion of the resignation of their respected President, resolve that their recommendations be adopted and carried out."

The report of the Flax Committee on the sample of Flax sent by Mr. H. Cope, Lahore, was submitted :—

The Gardener's monthly report for June was then brought forward.

Mr. McMurray says :—

" In drawing up my Report for the month of June last, I have first to state that since receiving the Chinese green dye plant into this garden, that two hundred and fifty-four (254) more plants have been propagated and added to the original stock of twelve plants received from Mr. Fortune. The greater number of these plants are now fit for planting out into the open ground, which is under preparation for that purpose, and will be planted during the present month, so as to ascertain as soon as possible whether the constitution of the plant is likely to stand the climate of Bengal, or become a remunerative crop for cultivation in it, which will be duly attended to, and the result reported for the information of the Society.

The Chinese rice paper plant is also doing well, and has sent up one fine strong sucker from the roots, which will soon be ready for removing from the parent plant. When that takes place, and the sucker becomes well established in the pot after the shifting, the old plant will be transferred to the open ground.

The Chinese millet and rice seed, received from Mr. Fortune in February last, were sown on the 25th March following, have progressed satisfactorily up to the present time.

Of the thirteen kinds of Pegu rice seed presented to the Society by Mr. W. Ward (through Mr. Earle) on the 21st ultimo, and sown on the 22nd, the whole thirteen kinds have germinated very freely, and are doing well.

Seven good new kinds of plants were received from the H. C. Bot. Garden on the 20th June last in excellent order.

Mr. F. Frost's presentation of two kinds of Pegu rice seed, and one Camelia Japonica plant were received on the 10th instant in fair condition.

Sir L. Peel's contribution of twenty packets of the best English and Scotch sorts of Hollihock seed was received on the 7th instant in apparently good order.

Mr. C. B. Stewart's presentation of the following kinds of plants from Sydney, viz. 1 Podocarpus Spinulosus, 2 Araucaria Cookeii, 3 A. Cunninghamii, 4 A. excelsa, 5 Blanfordia nobilis, 6 Crinum longifolium, 7 Dendrobium speciosa, were received on the 7th instant in a very healthy state.

In conclusion, I have to add that the Victoria Regia plant has produced six new leaves since the date of my last report, the largest of which is rather more than three feet ten inches in diameter, and that the plants have again commenced to flower, and produced two fully expanded flowers since Sunday night last."

Communications on various subjects.

1. *From Mr. D. Landreth, Philadelphia,* enclosing bills of lading and invoice of seeds sent by him per *Scargo*, and requesting that as 50 bushels of Sea Island cotton seed have been forwarded by mistake, instead of 10, that the surplus be disposed of on his account at cost price.

2. From F. A. Glover, Esq., Mootecharee, intimating that he is on the point of despatching the peach grafts for the Society, and that he has arranged about the expences of bringing them down.

3. From W. G. Young, Esq., Officiating Under-Secretary, Government of Bengal, stating that if the authorities at Bareilly are desirous of obtaining free transit of their seeds, that they should apply to the local Government.

4. Messrs. Grindlay and Co., handing their account current, which shews a balance of £10-18-2 in their favor.

5. The Hon'ble Sir Lawrence Peel tendering his resignation of the office of President of the Agricultural and Horticultural Society from the end of the current year.

6. From R. J. Hollingberry, Esq., requesting to be allowed a collection of plants from the Society's Garden to take with him to America, and offering to reciprocate by sending such American plants as the Society may want.

Referred to the Garden Committee.

For all the above presentations and communications the best thanks of the Society were accorded.

(*Saturday, the 19th August*, 1854.)

W. Haworth, Esq., Vice-President, in the Chair.

The proceedings of the last Monthly Meeting were read and confirmed.

The following gentlemen, who were proposed at the last meeting, were, duly elected members :

Lieutenants E. K. O. Gilbert, and E. V. Utterson, Mr. C. B. Stewart, Captain P. Saliz, Mr. G. Rogers, Lieutenant W. S. Row, Captain F. C. Jackson, Capt. Ivie Campbell, Mr. J. Agabeg, and Mr. D. C. Mackey.

The names of the following gentlemen were submitted as desirous of joining the Society :—

Brigadier Hill, Commanding Gwalior Contingent,—proposed by Capt. V. Eyre, seconded by Mr. W. G. Rose.

Lieut. H. S Bivar, 18th Regiment N. I., Junior Assistant Commissioner, Assam,—proposed by Lieut.-Col. F. Jenkins, seconded by Mr. S. Douglas.

Lieut. E. W. Barwell,—proposed by Dr. D. Scott, seconded by Mr. John Ross.

C. K. Dove, Esq., Deputy Post Master General,—proposed by Mr. W. G. Rose, seconded by Mr. S. Douglas.

P. Anderson, Esq., Calcutta,—proposed by Mr. W. G. Rose, seconded by Mr. C. A. Cantor.

James Findlay, Esq., Merchant, Calcutta,—proposed by Mr. W. *Haworth, seconded by Mr. S. Douglas.*

T. B. Bennett, Esq.,—*proposed by Mr. W. Duff, seconded by Mr. W. G.* Rose.

B. W. D. Morton, Esq.,—proposed by Mr. A. Grote, seconded by Dr. H. Falconer.

Presentations.

1. From J. R. Logan, Esq., *Journal of the Indian Archipelago*, Vol. VIII, Nos. 1. to 4.
2. From Messrs. R. Scott, Thomson and Co., a bottle of Gutta Percha Cullodion.
3. From F. A. Glover, Esq., 40 Peach grafts from Moteeharee.
4. From A. J. Sturmer, Esq., samples of Cotton and Flax, grown at Azimghur.
5. Lieut. F. W. Ripley, Akyab, 3 kinds of Tobacco seed, Havannah, Dutch, and Java.

Motions.

The motions of which notice was given at the last Meeting, were then brought forward as follows :

Proposed by Mr. W. G. Rose, in the absence of the President, and seconded by Mr. Montague, and carried :

"That the recommendation of the Special Committee, which has been approved by the Council, that Mr. Blechynden's leave of absence be extended for three months, and the sum placed at his disposal for travelling expenses, be increased to £100, be confirmed."

Proposed by Baboo Peary Chand Mittra, seconded by Mr. W. G. Rose, and carried :—

"That the Society award a premium of Co.'s Rs. 1,000, for submitting to it on or before the 1st December, 1855, the most approved specimen of not less than 50 mds. of Rheea fibre, the whole to be the produce of the party tendering it, and 10 mds. of which to become the property of the Society, to be accompanied by a detailed statement of the process followed in its cultivation, and after preparation, and the cost of the same, the quality to be approved by the Society, and the fibre to be in a fit condition for the English market."

The following motion was then submitted by Baboo Peary Chand Mittra, seconded by Stewart Douglas, Esq., and carried :—

1. "That this Society records with deep regret the death of Mr. Willis Earle, and desires to take this opportunity of publicly acknowledging its *sense of his indefatigable exertions and lively interest on behalf of this Society*, of which he was a member for upwards of 24 years.

2. "That a copy of this resolution be forwarded to Mr. Earle's relatives in England."

Reports.

The Report of the Garden Committee, as approved and recommended by the Council on the proposed improvement of the Society's Garden School, was then read as follows :—

Report of the Garden Committee of the Agricultural and Horticultural Society, at a Meeting held at the Society's Garden, on Tuesday, the 8th of August, 1854.

Present.

Messrs. W. G. Rose ; S. Douglas ; and C. A. Cantor, Members ; Rev. J. Long, Visitor ; and Mr. S. H. Robinson, Acting Secretary.

The Meeting was held for the purpose of inspecting the state of the Garden School, with the view of rendering it of more utility than it has hitherto been, in educating a superior class of mallees, whose services may be hereafter available to the public, and thus being auxiliary to the improvement of Horticulture generally in India.

Your Committee, after inspecting the School-house, and examining the boys under instruction there, beg to report as follows :—

1st. The number of boys at present instructed in the School, is twelve only, half of their time being given to working in the Garden, and the remaining half to school instruction, the latter is of the most elementary description, being only such as is taught in the lowest grade of village schools ; these boys receive wages at the rate of Rs 1-8 to 2 per month, and the total expense, including the instruction afforded to them, is on the average as follows :—

Wages to 12 Boys in all per month, ..	19	4	0
Wages to Schoolmaster, ...	6	0	0
Stationery, &c., ...	0	12	0
Rs., ...	26	0	0

2nd. In addition to the deficient school instruction they receive, another and greater drawback to their becoming experienced mallees is the practice they have of leaving the Garden employ altogether, as soon as they have learnt a little of their business, or sufficient to induce persons requiring mallees to give them higher wages, in the present difficulty of procuring good men for such work at all.

3rd. Your Committee are of opinion that a small additional outlay might be sanctioned by the Society, with the object of improving the School, and thereby encouraging the education of a superior class of mallees, and they conceive that such would be a very legitimate application of a portion of the Society's funds.

4th. The scale they recommend being adopted, is as follows :—

24 Boys' allowance at 1·8 to 2 per month, ...	38	0	0
A Head Schoolmaster, ...	12	0	0
The present Schoolmaster as assistant,...	6	0	0
Stationery per month, ...	2	0	0
Rs., ...	58	0	0

being a permanent addition of 32 Rs. to the present monthly outlay, and besides the above, a grant of Rs. 25, on opening the School, for purchase of maps and books ; and that accommodation be afforded to the additional number of boys proposed, by including in the School-room the adjoining room under the same roof, which is now used as a godown, and can be spared for the purpose.

5th. And lastly, they recommend that all boys admitted in future be bound as apprentices to the Society's Head-Gardener, for a term of five years, under Government Regulation XIX of 1851, and that the plan now proposed, be considered as an experiment, to be extended if the result proves successful.

6th. In closing their report, the Committee beg to acknowledge the assistance and advice they have received from the Revd. Mr. Long, of Mirzapore, near Calcutta, who has promised to visit the School periodically, and to take an interest in its progress.

(Signed) ST. DOUGLAS,
" WM. G. ROSE,
" C. A. CANTOR.

Notice of motion was then given by C. J. Montague, Esq. :—

" That the report of the Garden Committee, recommended by the Council, involving an additional monthly expense of Rs. 32, and a present outlay of Rs. 25, on account of the Garden School be adopted."

The Report from the Translation Committee was next brought forward as follows :—

" The Translation Committee beg to recommend that the first part of the *Indian Agricultural Miscellany* (now out of print) be reprinted, it being in great request, and that all the numbers of the publication be sold at Two Annas per number.

The Committee beg further to recommend that a copy of each of the Nos. published be sent to the Government of Bengal, with a request to know if it requires any number of copies for the Vernacular Schools, and the Libraries at Sudder Stations, in progress of promotion."

(Signed) SHIB CHUNDER DEB.
„ PEARY CHAND MITTRA.
„ PERTAUB CHUNDER SING.
„ HOREE MOHUN SEN.

With reference to the above, the Council having recommended that the usual number of copies be reprinted and offered for sale at cost price, which is about Four Annas per copy, and that the second proposal of forwarding a copy of the Journal to Government, be carried out.

It was moved by Mr. W. G. Rose, seconded by Mr. R. Blechynden, and carried :—

"That the Report of the Translation Committee, as amended by the Council, be adopted."

The Gardener's Monthly Report for July, was then brought forward, as follows :—

In submitting my report for the month of July last, I have also the pleasure to forward you a tabular statement of the American vegetable seeds for 1854, wherein the result of each kind is exhibited, and from which it will be seen that the average per cent. of seeds vegetated this season is equal to that of last; still, I do not consider the seeds in general so good, as is evident, and will be observed from the statement, that seven of the most important kinds of the seeds have wholly failed, although every possible attention and care were paid to their treatment while under trial, and two different sowings made before I was satisfied that the seed was bad,—the mouldiness of the seeds when received, denoted that they had either been packed up in a greenish damp state, or that the cases had got damaged or wet on their passage, which caused fermentation to take place, and kill the germinating power of the seed.

The twenty kinds of Hollihock seed, presented to the Society by Sir Lawrence Peel, on the 7th, were sown on the 8th July. All the sorts have germinated freely, and the seedlings have been pricked out of the seed gumlah, and are doing well.

The Chinese green dye plant has been planted out in an open plot in the orchard, where it is now making a better growth than when kept in the pots.

Two more of the Victoria Regia seed, presented to the Society by the late Dr. Wallich, on the 8th November, 1851, have germinated during this month, after lying in the gumlah of mud and water for two years and nine months. Of the old Victoria Regia Plant, which flowered so magnificently last year, and up to the month of July of the present season, the leaves have, I regret to say, disappeared beneath the water, and the root is still apparently fresh and firm on the mound, but little hopes of its recovery need be expected. This plant produced no perfect seed.

Rather more than half a biggah of the Jubbulpore Hemp plant is doing well this season in the Garden, from which I hope to gather a large quantity of seed during the cold season for sowing next spring on a much larger plot of ground, for the purpose of getting a quantity of the Hemp to compare with that from its native district.

Mr. C. Macleod's presentation of one Rose plant was received on the 30th July in a healthy condition.

In conclusion, I have to state that the fruit trees, shrubs, and other crops in the Garden, have made a healthy and vigorous growth during the past and present season.

Communications on various subjects.

1. From J. W. Dalrymple, Esq., stating that the Government were desirous of having two bushels of Sea Island Cotton Seed, for trial in Pegu.

The Acting Secretary intimated that two bushels of the Sea Island Cotton Seed just arrived from America, had been presented to Government in reply to the above.

2. From W. Jordon, Esq., dated Lima, 25th April. He writes as follows :—

"In consequence of having left England for this place in autumn last, I had only the pleasure of receiving your favor of 19th May, 1853, last week.

"Mr. Haworth's report on the New Granada hill rice, has been very gratifying to me ; as it confirms my assertion of the singular fact that it produces a succession of crops from the same seed.

"By this post I have written to a friend in New Granada, to forward to England two quintals of the same description of seed; taking care that it shall be as fresh and dry as possible : and Messrs. Bates, Stokes & Co. of Liverpool, to whom it will be consigned, will forward it to your address by the earliest opportunity, after its arrival.

"I much regret that so much time must necessarily elapse before you can receive the seed ; as I am convinced that in favorable situations, this rice should prove a valuable acquisition to India.

"In the province of Mariquita in New Granada, where it most abounds, it is found on the lower flanks of the Cordilleras ; and is generally sown on the slopes of the hills.

"Any further communication you may wish to make to me, have the kindness to direct to the care of Messrs. Bates, Stokes & Co., Liverpool, or direct to Lima."

Resolved.—That Mr. Jordon be specially written to with the best thanks of the Society for his contribution.

3. From Mr. D. Landreth, Philadelphia, enclosing invoice of a further shipment of Cotton and Tobacco seed to the care of Messrs. Grindlay and Co., London.

4. From Messrs. Grindlay and Co., relative to the above, shipped per *Maranon* for Calcutta.

5. From C. Horne, Esq., Bareilly, thanking the Society for the present to the Bareilly Gardens of a complete set of their Transactions.

6. From W. G. Young, Esq., states that the Lieutenant-Governor of Bengal, has granted permission to frank the cases of Cotton Seed for Major Hannay.

For all the above communications and presentations, the thanks of the Society were accorded.

(Saturday, the 9th September, 1854.*)*

William Haworth, Esq., Vice-President, in the Chair.

The proceedings of the last General Meeting, were read and confirmed.

The following gentlemen who were proposed at the last general meeting were elected members :—

Brigadier Hill, Lieut. H. S. Bivar, Lieut. E. W. Barwell, C. K. Dove Esq., P. Anderson, Esq., James Findlay, Esq., T. B. Bennett, Esq., and B. W. D. Morton, Esq.

The names of the following gentlemen were submitted as desirous of joining the Society :—

J. N. T. Wood, Esq., merchant, Calcutta,—proposed by W. G. Rose, Esq., seconded by R. Morrell, Esq.

R. Hampton, Esq., Collector of Backergunge,—proposed by C. Steer, Esq., seconded by R. Ince, Esq.

Lieut. G. M. Hall, 4th Regiment Irregular Cavalry, Hansi,—proposed by A. Skinner, Esq., seconded by D. Scott, Esq.

Baboo Kunny Loll Dey, Sub-Assistant Surgeon, Medical College, Calcutta, —proposed by Rajah Pertabchunder Sing, seconded by Baboo Peary Chand Mittra.

Rev. T. Boaz, L. L. D., Calcutta,—proposed by W. Haworth, Esq., seconded by S. Douglas, Esq.

S. H. Robinson, Esq., Acting-Secretary of the Society,—proposed by W. Haworth, Esq., seconded by W. G. Rose, Esq.

T. Brae, Esq., Indigo Planter, Jessore,—proposed by W. G. Rose, Esq., seconded by R. Morrell, Esq.

Presentations.

The following Presentations were announced :—

1. From the Asiatic Society copy of their Journal No. IV. of 1854.

2. From H. Cope, Esq., Secretary Agricultural Society of the Punjab, a sample of Silk produced at Lahore.

Referred to the Silk Committee.

3. From N. P. Crump, Esq., Monghyr, sample of Fibre grown in his garden.

Referred to the Flax Committee.

4. From Major Phayre, Commissioner of Pegu, two large samples of Bast from Rangoon, with four of the trees producing one of the kinds of the same article.

5. From J. Agabeg, Esq., a case of plants from Penang, including the Pine Apple and Penang Betel Palm.

6. From R. Fortune, Esq., a packet of Cabbage Oil Seed, and two specimens of cloth dyed with the Chinese green vegetable dye.

Motions.

The following motion, of which notice was given at the last General Meeting, respecting the Society's Garden School, was then brought forward, viz.:—

"That the Report of the Garden Committee, recommended by the Council, involving an additional monthly expence of Rs. 32, and a present outlay of Rs. 25, on account of the Garden School, be adopted."

Upon which it was proposed by Mr. C. J. Montague, seconded by Baboo Rajendraloll Mitter, and carried—

"That the Report of the Garden Committee, as recommended by the Council, be adopted."

Notices of Motion.

The following letter, addressed to the Council of the Society by the Acting Secretary, was then read:—

"Having been now four months Acting Secretary to this Society, I consider it incumbent in me to bring to your notice any matter connected with its working, which in the course of my duties may occur to me as susceptible of improvement.

Amongst other subjects I have noticed the disproportionate encouragement at present offered by the Society to Horticultural pursuits as compared with what is given to its other or Agricultural department, and being under the impression that the extent of this disproportion may not have been generally noticed by the Society, I have had a comparative statement drawn up and annexed hereto of the amounts expended under the two different heads, as far as I have found it practicable to divide them. From this it will be seen that the average annual expenditure of the Society for the last three years on Horticulture has been nett 13,816 Rs., more than two-thirds of the average total annual expenditure, against an average for the same period of 6,537 Rs. on Agriculture.

Should it be considered desirable to remedy this state of things, and apportion the expenditure of the Society more equally between its two branches, I would suggest as one step towards effecting this object, the offering by the Society of periodical prizes for approved Reports or Essays on Indian Agricultural subjects, on the same principle as adopted by the Agricultural Societies at home. I think that were 1000 Rupees per annum of the Society's funds set apart for this purpose, say for two prizes of 500 Rupees each, it might be the means of collecting together valuable information, in a useful and practical form, on some of the most important Indian Agricultural staples, and the want of which is now frequently experienced.

I would suggest the usual practice be followed in such cases, of awarding prizes only for such Essays as might be approved by the Society, and for the approved papers to be considered the Society's property, for publication in their Journal, or separately as they might determine,—the Society, of course, affording to intending competitors any information already collected by them towards forming as complete and valuable a treatise as possible on each subject.

The choice of subjects would of course require the consideration of a Committee of the Society, as well as the conditions as to the amount of matter they should contain, and other similar details. I will merely in conclusion suggest the following as amongst the more prominent subjects on which probably valuable Essays might be elicited :—

For an approved Essay on each of the following subjects :—

1st.—On the progress and present position of Indigo cultivation in Bengal.

2nd.—On the position and prospects of Tea cultivation in Assam.

3rd.—On the Sugar Cane cultivation of the Benares and surrounding districts.

4th.—On the cultivation of Jute and other useful fibres in Bengal.

5th.—On the Tanning products of India.

6th.—On the production of Caoutchouc and Gutta Percha in India.

7th.—On the clearing and cultivation of the Sunderbunds of Bengal.

8th.—On Date Tree cultivation in Bengal.

9th.—On the relative cost and production of the various Oilseeds of India suitable for export.

10th.—On the progress of Opium cultivation in India, and its influence on other agriculture.

11th.—On the Silks of India."

The letter was accompanied by a recommendation from the Council to the following effect :—

"That the suggestions of the Officiating Secretary as to giving premia for Essays on Agricultural subjects be adopted, and that, if necessary, the funds required for this purpose be taken from the vested property of the Society, and that a recommendation to that effect be submitted to the next General Meeting, and that in the event of this recommendation being adopted, a

Special Committee be appointed for selecting the most practical subjects on *which Essays are to be required, and for determining the amount of premium to be given.*"

Upon reading the above papers, notice of motion was given by Baboo *Peary* Chand *Mitter in the following terms* :—

"That the recommendation of the Council as to giving a premium not exceeding one thousand Rupees annually for Agricultural Essays be received now, and that it be taken into consideration and adopted at the next meeting."

A petition was then read from Beemchund Doss, Book-keeper in the Society's Office, for an increase of pay, with a recommendation from the Council that he should have an increase of 5 Rs. per month ; whereupon notice was given by Mr. C. J. Montague as follows :—

"That the recommendation of the Council respecting the increase of pay to Beemchund Doss of 5 Rs. per month be confirmed at the next Meeting, and that the increase take effect from 1st September instant."

Reports.

The Gardener's Monthly Report was then read. Mr. McMurray reports as follows :—

"In continuation of my report on the American Pettigulf Cotton Seed of this season's importation, I have now to state that the second batch of seed, was received in the garden on the 28th and sown on the 29th ultimo, from both the top and centre of the barrel from which the first trial sowing was made, and that the seed out of the centre has yielded seven (7) per cent, whereas that from the top has again totally failed under the same treatment, both samples having been sown side by side in the open ground, and in gumlahs placed in the Conservatory. From this circumstance it may be surmised that the barrel may have been placed on that end, and that in a damp part of the ship while on the passage to this port. The seed at the other end of the barrel may be perfectly dry, and the seed good, which I should say deserves another trial for further information ou this important subject. The Sea Island Cotton Seed, presented to the Society by J. L. Nash, Esq., in December last from Mr. W. Sebrook's plantation in Eddesto Island, Charleston, South Carolina—stated to yield the finest description of Cotton yet produced, and which gained a medal at the Great Exhibition of all nations, and declared by the Manchester spinners to be the finest ever imported to England,—the plants obtained from this seed are now coming into a bearing state in the garden, the produce from which seems to yield a fine description of cotton, as will be seen from the accompanying three pods or boles.

The 'Kau' and 'Sooloor' nuts of the Sandwich Islands, contributed to the Society in March last by Mr. R. J. Hollingsworth, with other kinds of seeds, have germinated. The first-named kind is one of the Cordia Sp., and the second is *Aleurites triloba*, or '*Ukhrot*' of Bengal. The first sowing made this season in the garden of the acclimated American maizé corn is now ripe, and will be forwarded to your Office next week for general distribution to the members. A few specimen cobs I now send for laying before the present meeting, which may be deemed equal to the original stock. Since the date of my last report one more of the *Victoria Regia* seeds, presented to the Society by the late Dr. Wallich in November, 1851, has germinated.

The forty peach and plum grafts and seedling plants, presented to the Society by F. A. Glover, Esq., were received on the 22nd July last in very good order.

Mr. A. D'Cruz's contribution of five seed kinds of Dahlia plants were received on the 5th instant in good condition.

Mr. J. Agabeg's contribution of two hundred and thirty-four Betelnut seeds, and fifteen Pineapple plants from Penang, were received in good order on the 7th instant."

The sample of Cotton referred to by Mr. McMurray was much admired by the Meeting, and it was ordered to be referred to the Cotton Committee.

Communications on various subjects.

1. From A. H. Blechynden, Esq., Secretary of the Society, dated London, 24th July, 1854. The following is extract from the letter :—

"I beg to acknowledge receipt of your letter of the 30th May, intimating that you had remitted to Messrs. Grindlay and Co., the sum of £30 to meet the cost of bell glasses, cast iron labels, and galvanized iron wire, for the use of the Society's Garden, in accordance with the recommendation of the Garden Committee, submitted in their report of March last. Will you have the goodness to inform the Society that I shall use my best exertions to execute this commission promptly and efficiently, and to obtain as many of each of the articles detailed as the amount placed at my disposal will admit.

I may take this opportunity of mentioning that I propose to submit to the Society of Arts, with a brief account of each, the specimens of oils detailed at the foot of this letter, which, by permission of the Council, I selected from our Society's Museum. Mr. Foster, the Secretary, with whom I have been in communication, has promised to insert such account in the Society's Journal (which is published weekly and is largely circulated) and to use, moreover, his best endeavours to bring them to the notice of persons interested in such articles.

I hope to inform you, in my next letter, what steps I have taken towards meeting the Society's commission for a new Medal-Die, and for gold and bronze medals.

1. The 'Jychee' of Rohilkund, or 'Titlee' of Gorruckpore, an Euphorbiaceous plant. I have just received from Mr. Bridgman, of Gorruckpore, a

dried specimen of this plant, which Dr. Royle has kindly promised to examine, and to give me the botanic name.

2. The 'Junglee Buddam,' *Sterculia fœtida.* See Mr. Haworth's notice of this fine oil. *Journ.* Vol. VIII, part 1, p. 39.

3. The 'Dessee Akroot' (*Juglans camirium*, or *Aleurites triloba* of Roxb.) See Dr. Riddell's communication to the Society. *Journ.* Vol. VIII., p. 4, p 220.

4. The 'Sirgoojah,' or Ramtil, *Verbesina sativa.* Roxb. *Journ.* Vol. VII, part 1, and Vol. VIII. part 1. p. 61.

P. S.—July 25, 1854.—I have seen Mr. Carter several times respecting the approaching season's supply of flower seeds; and for the reasons assigned in his letter to me, which I enclose, have thought desirable not to interfere with the proposed period of despatch. He told me, what I observe he has repeated in writing, that by a later despatch, even the commencement of November, he could not ensure the Society a collection of fresher seeds, (with exception of a few sorts) than what he is now preparing."

2. From Mr. Jas. Carter, Seedsman, dated London, July 22. Mr. Carter writes as follows:—

"I have the pleasure to inform you that I am now occupied with the preparation of the Flower seeds for the Agri-Horticultural Society, and I have every reason to believe that this year's collection will surpass all the former. As many of the seeds do not ripen till November, it would be detrimental to the interests of the Society to wait for the new crop, for it is generally the end of December before the whole, including the foreign, are received here. A few of the early flowering sorts, such as Viola and Calceolaria, ripen their seeds in good time, and shall be sent as far as possible of this year's growth. The Calceolaria will, I flatter myself, surpass anything ever sent to India, the seed having been saved from the finest English and Continental collections.

I propose forwarding the seeds at the usual time in August, which, under all circumstances, I consider the most favourable month for shipping, and I cannot help thinking that the failures of last season were in a great measure owing to the alteration of the time, for I feel convinced that the quality of the seeds was equal to that of former years.

In consequence of the disappointment experienced by the partial failure of last year's seeds, I shall, without extra charge, increase the number from 70 to 85, but I beg it to be understood that such additional packets cannot in future be sent without a proportional increase of the price. Among the additional seeds will be found Calliopsis, comprising splendid new varieties, Anemone, Jacobæa, 6 var., several new, Madaria elegans, &c., &c. The Œnothera, white and yellow varieties, are separated from the Godetias, which are mostly violet and purple, will be found desirable, as they differ so much from each other in size and habit.

In conclusion, I beg to say that everything shall be done to render the collection in every respect satisfactory, the mixtures will be found first-rate. The Asters, for instance, will comprise more than *fifty* varieties, many entirely new. Phlox upwards of 20 varieties, comprising the brightest and most beautiful varieties.

I must now conclude for the present, but shall be happy to give you any further information you may consider desirable."

3. From Lieutenant J. Williamson, dated Shaik Buddeen, 14th August, stating that he should be glad if a proposition could be originated by any of the members agreeing with him for reducing the annual subscription of members residing more than 800 miles from Calcutta to 16 Rs. per annum.

This letter had previously been submitted to the Council, who did not see the necessity for the proposed change. The meeting agreed in opinion with the Council.

4. From S. Mornay, Esq., Upper Assam, stating that he is cultivating a species of mulberry with large uneven entire shining leaves, one of which measured 15 inches long, and 11 inches wide: also that he is cultivating 20 acres with Rhea plant, and intends competing for the prize offered by the Society.

5. From Messrs. Grindlay and Co., acknowledging receipt of bill for £30., to be held at the disposal of Mr. Blechynden.

6. List of parties to whom the Acting Secretary proposed to distribute the twenty copies of the pamphlet on Rhea and other Fibres presented by Government to the Society. Approved.

For all the above presentations and communications the thanks of the Society were accorded.

(*Saturday*, 14*th October*, 1854.)

Baboo Gobinchunder Sein, Vice-President, in the Chair.

The proceedings of the last general meeting were read and confirmed.

The following gentlemen, who were proposed at the last general meeting, were elected Members:—

J. N. T. Wood, Esq.; R. Hampton, Esq.; Lieut. G. M. Hall; Baboo Kunny Loll Dey; Revd. Dr. T. Boaz; S. H. Robinson, Esq., and T. Brae, Esq.

The names of the following gentlemen were submitted as desirous of joining the Society:—

Lieut. W. J. Gray, Artillery, Cawnpore,—proposed by Lieut.-Col. R. Horsford, seconded by Lieut.-Col. R. Houghton.

W. S. Hudson, Esq., Junior Assistant to the Commissioner of Assam, Mungledye, Durrung,—proposed by Lieut.-Col. F. Jenkins, seconded by W. G. Rose, Esq.

Lieut. F. G. Eden, 2nd in command, 1st Assam Light Infantry,—proposed by Capt. Dalton, seconded by A. Grote, Esq.

Lieut. A. K. Comber, Adjutant 1st Assam Light Infantry, proposed by Capt. Dalton, seconded by A. Grote Esq.

The Maharajah Issoree Persaud Narain Bahadoor, Rajah of Benares, - *proposed by Rajah Suttochurn Ghosal Bahadoor, seconded by Baboo Pearychand Mittra.*

Presentations.

The following presentations were announced :—

1. Sample of Rope made from the bark of the Custard Apple Tree. *Presented by S. F. Seymour, Esq.*

2. Specimen of Fibre produced from plants raised from one of the kinds of Chinese seed, received from Mr. R. Fortune. *Presented by Lieut.-Col. Hannyngton.*

3. Samples of Fibre produced from the Plantain, Pine Apple, Yucca, and *Hibiscus esculentus. Presented by Dr. Riddell, Bolarum.*

4. Two plants of Durian, from Mr. Edwards, Collector of Customs, Rangoon. *Presented by C. C. Mackenzie, Esq.*

5. A packet of New Zealand Maize seed. *Presented by the Rev. Dr. Boaz.*

6. Selections from the Records of the Government of India, on the suppression of human sacrifice and female infanticide in Orissa. *Presented by the Government of Bengal.*

Motions.

The notice of motion given at the last General Meeting, to the effect that "the recommendation of the Council as to giving a premium not exceeding one thousand Rupees annually for Agricultural Essays, be received now and taken into consideration, and adopted at the next General Meeting,"—was then brought forward, when it was moved by Baboo Pearychand Mittra, seconded by Mr. T. J. Watson, and resolved that the recommendation of the Council be confirmed.

Upon which it was moved by Baboo Pearychand Mittra, seconded by Mr. T. J. Watson, and resolved, that Messrs. A. Grote, W. Haworth, and Baboo Ramgopaul Ghose, be appointed a Committee for selecting subjects, and determining the amount of premia to be offered for Agricultural Essays.

It was afterwards suggested by the Acting Secretary that the name of Baboo Pearychand Mittra be added to those composing the Committee, which was agreed to.

The following motion, of which notice was given at the last Meeting was next disposed of, "That the recommendation of the Council respecting the increase of pay to Beem Chand Doss, of 5 Rs. per month, be confirmed at next meeting, and that the increase take effect from 1st September instant."

Moved by Mr. W. G. Rose, seconded by Baboo Gobinchunder Sein, and resolved that the recommendation of the Council be confirmed.

Reports.

The Report of the Committee of the Council appointed to wait on the Hon'ble Sir Lawrence Peel, with a request that he should sit for his portrait to be suspended in the Society's Hall, in conformity with the resolution passed at the July Meeting, was then brought forward. It stated that Sir Lawrence Peel had addressed a letter to one of their number, Dr. Falconer, dated the 18th August, again declining the request of the Agricultural and Horticultural Society for his portrait, and assigning reasons which leave no room for further solicitation.

The following letter, dated 18th July last, from the Hon'ble President, addressed to the Acting Secretary of the Society, was then read :—

" I have the honor to acknowledge the receipt of your obliging letter. The kind feeling evinced towards me by the Members of the Council and of the General Meeting who joined in the request to me which your letter conveys, is reward enough for any services which I may have rendered to the Agricultural and Horticultural Society of India. To have been honoured by the appointment which I held in the Society, and to have received so kind an expression of regret at the loss of my services which will shortly ensue, is really more than my services have merited, and so great an honor as having my portrait placed in its Hall, is one of which I cannot accept. I am averse to receiving any public honors which should in my opinion be rarely bestowed, and then only on men of an order of merit far surpassing mine. I am conscious that I have done little for the advancement of the most important interest of our Society, the promotion of Agriculture, and the stimulus which I may have given to Horticulture by following a very favourite pursuit, is not a merit of mine, though I may have been indirectly instrumental in promoting the Horticulture of India. Looking at the names which our Society has possessed and still possesses, I cannot place myself at all on a par with them : and as to the services of President merely, the appointment rewards me in the distinction and honor which it confers.

" It is a case of feeling on my part. My reasons may not convince others ; but I have a strong reluctance which I cannot overcome to the receipt of any mark of honor. Let me be kindly remembered by those whom I kindly regard, and that is all that I desire or can accept. The good opinion of the members of the Society will always be valued by me, and my poor services are at their disposal wherever I can be useful."

This was accompanied by a recommendation from the Council that a short abstract of the letter should be published. Upon which it was proposed by Mr. T. J. Watson, seconded by Mr. Joseph Agabeg, and resolved.—" That the correspondence with Sir Lawrence Peel on the subject of his portrait be published for the information of the Members of the Society."

The Report of the Sub-Committee of the Council appointed to take into consideration the proposal of the Chief Magistrate to convert the ground enclosed by the Calcutta Race Course into a public garden, was next read as follows :—

"The Sub-Committee having taken into consideration the several documents *noted in the margin beg to report as follows* : –

1. *Letter from the Chief Magistrate of Calcutta to the Secy. to Govt. of Bengal,* dated 3rd January, 1854.
2. Letter from Secy to Govt. to Secy. Agri.-Hort. Socy., dated 23rd January, 1854.
3. Report of Meeting of Sub-Committee held on 28th February, 1854.
4. Estimate of expences of balustrade and tank, from Mr. Robt. G. Rose, dated 27th May, 1854.

1. From the estimates before them, it appears to the Sub-Committee, that the probable preliminary expense of forming the proposed garden on a proper scale, would be about 30,000 Rupees, and the expence of maintaining it afterwards would also have to be considered.

2. The Sub-Committee are of opinion that such a garden would be a very desirable ornament to the City, and highly advantageous to the community as a promenade, as pointed out by the Chief Magistrate, but they do not consider it could be made otherwise than indirectly and partially subservient to the objects of the Agricultural and Horticultural Society of India. Whilst therefore the Sub-Committee cannot recommend the Society's taking a prominent part either in the management or expence of forming and maintaining such a garden, they consider the design as a public undertaking, would be well deserving the patronage and countenance of the Society.

3. They therefore are of opinion that the Society in their reply to the Secretary to Government, should strongly recommend its being encouraged, and that it should be intimated that the Council would recommend to the Society at once to aid the undertaking, should a public subscription list be opened, with a donation of 2,000 Rs.

(Signed,) H. Falconer,
" A. Grote,
" Ramgopaul Ghose."

Calcutta, 10*th October*, 1854.

It was then proposed by Baboo Pearychand Mittra, seconded by Mr. J. Agabeg, and resolved that the Report be published, and that its further consideration be postponed to next General Meeting, to give the Members generally an opportunity of considering the Committee's proposal in the interim.

The Gardener's Monthly Report was then submitted. Mr. McMurray writes :—

"In drawing up my report for the month of September, I have first to state that the Rattoon crop of Sugarcanes cultivated in the Garden this season have made a very luxuriant growth, and will be at full maturity by the end of this month, when the whole crop, amounting to some where about eight thousand (8,000) canes may be offered to the Members and public at the fixed scale of charges. The names of the canes under reference are as follows, viz., Mauritius, Singapore, Striped Bourbon, Otaheite and China. Twenty-five sorts out of the twenty-eight kinds of Cape Vegetable Seeds, now under trial in the Garden, have already germinated very freely. A tabular statement of the percentage will be submitted for laying before the next general meeting of the Society.

The Jubbulpore Hemp plant, under cultivation in the Garden, has had a fair trial this season, and may now be considered a crop that will grow well in Lower Bengal during the rainy season ; but from the plant being very subject to the attacks of insects on the stems, it is yet questionable whether the fibre will be as good as that produced in the native locality of the plant, or that the crop will be sufficiently remunerative to recommend its cultivation on a very extensive scale until further information be received. The insects attack the crop at an early stage of its growth, and before the plants reach full maturity the action of the wind on the crop breaks the whole of the stems that have been severely attacked by the insects, from two to three feet above the ground. From these stems I have been trying to find out what length of time the fibre may require in the steep, and have ascertained that three days will be about sufficient for that purpose, but it must be observed that this experiment was tried on a small scale, and that a common sized three feet girth sheaf may require more or less time in the water.

The Chinese wild and cultivated green dye plants have made a splendid growth since planted out in the open ground. The latter kind in particular is a robust grower ; both sorts are likely to do well in the climate of Bengal at all seasons of the year.

The blue dye plant, also received from China, and called the "Justicia species," is not at present likely to succeed so well as the above two sorts. The Chinese rice paper plants are doing well, and have been increased in number since the date of my last report on these plants.

The four "Durian" seedling plants, presented to the Society by Captain Weston in November last, were planted out in the open ground at the commencement of the rains this season, and since that time have made two feet high of a very healthy growth, and thrown out many side branches.

Mr. J. St. Burton's contribution of one plant of lime-tree and another of Nymphæ rubra, were received on the 9th September in a healthy condition.

Captain G. A. Grainger's present of the following excellent sorts of plants from Singapore were received on the 9th September, in very good health; viz., 7 Nepenthes Rafflesiana, 5 Orchids, 2 Naphelia species, 1 Hoya species, 6 Lycopodium species, and one other plant, apparently a Hoya.

Major Phayre's contribution of four Sterculia species of plants were received on the 13th September in good order."

A recommendation from the Council was next submitted, founded on the following memorandum, and enclosed from the Secretary of the Society, dated Perth, 23rd August, 1854:—

Memorandum.

Having had an opportunity, during my recent visit to Edinburgh, of seeing the beautiful and extensive nursery grounds of Messrs. Peter Lawson and Sons, and of ascertaining the means at their command of raising seeds, and of obtaining supplies from other nurseries in Great Britain as well as on the Continent, I am more than ever anxious that the Society should make another attempt to procure a consignment of vegetable seeds from them, preparatory, as I hope, to further and larger annual supplies. With this object in view I have ventured to place myself in communication with them, and enclose copy of my letter, and their reply, in original, for submission to the Council.

In regard to expense, it will be observed that Messrs. Lawson and Son's estimate amounts to £159-11, or say Rs. 1,600,= Rs. 2-10-9 a parcel consisting of twenty-six sorts of lighter seeds, six sorts of peas, and four of beans, or thirty-six papers in all; something more must be added for boxes and packing charges—say 5 as. 3 p. or Rs. 3 a parcel. I think this will be found as cheap, if not cheaper than Messrs. Villet and Son's annual bills, their charge being, I believe, Rs. 3-8 per parcel, including all expences of packing, &c. I think the quantity of the lighter sorts of seeds, which Messrs. Lawson propose giving is more than what Messrs. Villet supply; the peas and beans may be about the same, or rather less.

As respects the quality of produce raised in India from the Cape and Scottish seeds respectively, experience has proved the latter, with exception, perhaps, of a few kinds, to be superior to the former: this remark holds good, I believe, to most parts of the country, but more especially to Upper India.

With reference to the period of despatch: it may be deemed desirable to have two despatches, as proposed by Messrs. Lawson, viz., one in December and the other in January. The first would reach Calcutta at the close of April, and could be distributed to the Society's *up-country Members* in May, reaching the most distant before the commencement of the rainy season, and thus prevent their being subjected to a long dawk banghy journey in damp weather. Many of the Mofussil subscribers, especially those in the Punjaub, complain that the Cape and American seeds reach them late in the season: they might, were these suggestions adopted, commence their first sowings with Scotch seeds. The second despatch would reach Calcutta in time for distribution before the setting in of the rainy season: and *Town Members* might exercise their discretion as to the time of sowing.

As this would be merely an experimental consignment, the period of transmission being changed, it may not be deemed desirable, with reference to the large annual supplies from North America and the Cape, to appropriate so large a sum as Rs. 1,600 and upwards for an additional order. If so, it might be reduced one-half in amount, giving only one-half the quantity of seeds in each of the 600 parcels. This, of itself, will be a good addition to each Member's annual supply, for it will be observed that Messrs. Lawson have estimated the quantity in each parcel as sufficient to plant out an acre of ground.

In conclusion, I may add that the consignments of Edinburgh seeds of 1851, and 1852, were received in Calcutta, to the best of my recollection, in August or September, and were, consequently, four months older, on arrival, than those now proposed to be despatched will be.

MESSRS. PETER LAWSON AND SONS.

Edinburgh.

GENTLEMEN,—Referring to your letter to my address of the 3rd January last, (received in March, a day or two previous to my departure from Calcutta,) and to my recent conversation with your Mr. Charles Lawson, will you have the goodness to furnish me, at your earliest convenience, with replies to the following queries, for the information of the Agricultural and Horticultural Society of India:—

1st. What would be the probable cost of a consignment of vegetable seeds *in bulk* (not put up in paper) at the wholesale rate, consisting of as many sorts as were included in the consignment of 1852, and sufficient to meet the wants of 600 subscribers, each having moderate sized kitchen gardens of about an acre?

2nd. What would be the probable cost, in addition to the above, of say five or six of the best descriptions of peas, and for four of beans?

3rd. If such consignment were despatched,—say about the middle of January next,— would it consist of seeds of the freshest sorts?

4th. Whether in your opinion, such consignment, if sent by *a sailing vessel, viâ* the Cape of Good Hope, would reach in good condition, after a voyage of, say, four months? The charge for freight, on a large supply of such bulky articles as vegetable seeds, by the overland route, would be great in proportion to the cost of the seeds.

5th. If the consignment of 1851 was sent *in bulk* or put up in paper? I have some recollection of the Society obtaining a supply of seeds from your house, in bulk, but it may have been the small trial assortment which you despatched in 1849 or 1850.

I am, &c.,
(Signed) A. H. BLECHYNDEN.

EDINBURGH, *19th August,* 1854.

A. H. BLECHYNDEN, ESQ.,
Secy. A. & H. Socy. of India.

EDINBURGH, *19th August,* 1854.

SIR.—In reply to your letter of to-day, we annex note of the probable prices of the vegetable seeds, same sorts as we sent to Calcutta in 1851-52. We have put down the wholesale prices so far as we can judge at present, but as many sorts of garden seeds are not yet harvested, some slight alterations may be expected with regard to the prices of a few of these.

The quantities of the seeds on other side are what we calculate necessary to make up 600 collections of same size as those sent in 1852; you will of course be better able to judge than we can, if this quantity is sufficient for the subscribers' gardens.

The cost will therefore be thus:

	£	s.	d.
1st. Consignment of vegetable seeds in bulk sufficient to make up 600 collections fully as large as sent in 1852, ...	£ 87	3	4
2nd. Collection of peas and beans sufficient to make up 600 collections of 9½lb. each, ...	72	7	1
	£159	10	5

These are the cost, exclusive of packages, &c.

If a consignment, such as the annexed, were despatched by us about the middle of January next, we would be able to supply all of the new seeds, and of the very best description. With regard to the forwarding, it is our opinion that if properly packed, they may be sent *viâ* the Cape of Good Hope, without danger, and we should recommend their being sent in two despatches, that is, one half in December, and the other half in January. The consignment we sent in 1851, was put up in paper, same as in 1852.

Hoping to be favored with your further commands, which will claim our very best attention,

We remain, Sir, your most obedient servant,

PETER LAWSON AND SONS.

The Council recommend that a further trial should be given to Messrs. Lawson and Sons' seeds, by ordering as part of the Society's next year's indent, one half the quantity mentioned in their letter, in lieu of one half of the Cape seeds now annually received from Messrs. Villett and Sons.

This recommendation was adopted by the Meeting.

Communications on various subjects.

1. Letter from the Secretary of the Society, dated London, 8th August, 1854, of which the following is an extract: –

"In continuation of my letter of the 24th ultimo, I now beg to advise having executed the commission, with which the Society has entrusted me, for certain articles required for its garden. After making careful enquiries in various quarters, and with the assistance of Mr. Carter in obtaining estimates from other Firms, with which to test mine, I have instructed Messrs. Cottam and Hallen, of 76, Oxford Street, the well known makers of Horticultural implements, to furnish the galvanized wire fence and cast iron labels; and Messrs. James Hetley and Co., of 35, Soho Square, to furnish the propagating glasses. You will observe from the enclosed memo. which I have given in detail, for the sake of future reference, and with the view of checking Messrs. Grindlay and Co.'s account, that the sum (£30) remitted to Messrs. Grindlay and Co., on this account, being insufficient to meet the cost of the articles, to the extent mentioned in your letter of the 30th May, I have ordered Messrs. Cottam and Hallen to send only one half the quantity of iron fence, or sufficient to enclose *one acre instead of two.* The additional quantity can readily be obtained hereafter should it be required. I have requested Measrs. Grindlay and Co. to forward the boxes by the first opportunity *viâ* the Cape, duly advising you of their despatch. I have warned Messrs Hetley and Co., to pack the glasses most carefully in nests of ten each, and I hope they may arrive in an undamaged state.

Referring to the last paragraph of my former letter, will you have the goodness to inform the Council that I have intrusted Mr. James Pinches, of 1, James Street, Haymarket, with the execution of a new set of medal dies for the Society. I enclose copies of Mr. Pinches' letter and my reply. It was agreed that the new dies should be smaller than the old ones, about the same size as the College of Fort William medal. On showing the proposed size to Mr. G. G. Adams (a very rising Sculptor and Medallist) he recommended a size larger, similar to the medals which he has lately produced to commemorate the opening of the Crystal Palace: and this size I have given to Mr. Pinches for his guidance. The design will be similar to that of the old dies, but improved on in execution, and made, in every respect, more a work of art. I procured estimates from Messrs Adams, Wyon and Jarrett: the estimates from the two former are much higher than the amount set apart by the Society for the purpose. Mr. Jarrett's estimate (which Messrs. Grindlay and Co. obtained,) was less by about £10 than that of Mr. Pinches, but being an unknown artist, I thought it preferable to give the work to the latter, who has prepared, in good style, medals for other foreign Societies, and has promised to exert himself to give satisfaction to our Society. It *will be seen from the memo. annexed, that the amount will exceed by about £22 the sum remitted to Messrs. Grindlay and Co ; but that estimate, which* was drawn up by *me*, was a very low one. *Messrs. Hamilton and Co. offered* to get the work performed for £40, and Messrs. Charles Nephew and Co. or Lattey Brothers (I forget which) for £30. I ascertained, however, on my first visit to Mr. Foster, that it could not be well done by a London Medallist for the latter sum: he informed me that the Society of Arts had, unfortunately, employed a Birmingham artist to prepare a new set of dies for the same sum, but it was so indifferently executed, that they have been obliged to set it aside. The cost of bronze medals, with clips, he calculated at 10 shillings each, exceeding considerably Mr. Pinches' estimate. I have every hope Mr. Pinches will prepare the dies in a satisfactory manner. I may add that no exertion has been wanting on my part to secure the services of a good artist, willing to perform the work at a tolerably moderate cost."

2. From the Secretary, dated Perth, 23d August, 1854, of which the following is extract :—

"I made a careful inspection of Messrs. Lawson's extensive nurseries occupying upwards of 100 acres, and also of their large seed warehouse, and was much pleased with both. They likewise shewed me the large collection of specimens of Agricultural and Horticultural produce, made in wax, which they have prepared by desire of the British Government, for the Paris Exhibition. They have given me in exchange for some Indian seeds, a small assortment of grass seeds, which I propose sending by an early opportunity, for trial in the Society's garden : it may be that a few of them may prove desirable to introduce into India. I availed myself of this visit to Edinburgh to inspect the experimental gardens of the Caledonian Horticultural Society, the gardens and museum of the Royal Botanic Society, and the museum of the Highland and Agricultural Society of Scotland. In the absence of Professor Balfour, Mr. McNab, the head-gardener of the Botanic Society, has promised me some very fresh seeds, which they are now gathering, of various kinds of grasses, which they grow as specimens merely, and some of which, three or four in particular, I imagine may prove desirable introductions into the Upper Provinces : they are long rooted, much more so than the Guinea grass, seeking for nourishment at a good depth below the surface of the soil, and consequently not liable to be so readily destroyed by drought. In a country like India where thousands of cattle die annually for want of provender in the hot season, such a grass, could it be fairly introduced, would prove a most valuable boon. I will send this assortment of seeds by an early opportunity, and would ask Mr. McMurray's usual attention to them, that they may be fairly tested. All my attempts to obtain seed of the "Brazilian grass" (*Panicum spectabile*) have, I regret to say, hitherto failed : this grass would, I think from the accounts I have read of it, stand the drought of an Indian summer. I will still use my best endeavours to procure a *supply.*"

3. *From Lieutenant-Colonel Jenkins, Commissioner of Assam, reporting* a depreciation in the quality of potatoes produced in the Cossyah Hills, and requesting the aid of the Society in procuring fresh seed.

4. From C. M. Villet and Sons, with invoice of Cape seeds per *Edith*, and advising having drawn on the Society for value thereof, Co.'s Rs. 2,160, at 30 days' sight.

5. From Smith, Elder and Co., forwarding their account current to 30th June, 1854, advising despatch of sundry books by order of Mr. Blechynden.

6. From Lieutenant-Colonel A. Bogle, requesting a large supply of Garden seeds per first steamer to distribute amongst the native malees of that Province.

7. From Mr. James Carter, advising despatch of six cases flower seeds, per P. and O. Company's Steamer, and acknowledging receipt of £151-18s.

8. From E. Solly, Esq., tendering best thanks for the parcel of specimens of annual products received from the Society, and offering to reciprocate any information on the subject of his pursuits.

9. From Major G. E. Hollings, intimating his intention of sending to the Society specimens of cloth, thread, and twine, made of acclimated American Cotton grown there, and reporting that the Petti-Gulf Cotton seed received from the Society, has germinated very freely.

10. From S. F. Seymour, Esq., forwarding specimen of Rope made from the bark of the Custard Apple tree.

11. From Lieutenant-Colonel Hannyngton, advising despatch of a specimen of fibre produced from the plants from one of the Chinese seeds sent by Mr. Fortune.

12. From R. Riddell, Esq., advising despatch of samples of fibre from the plantain, pine apple, and Yucca, and requesting the Society's opinion upon them.

13 From C. C. Mackenzie, Esq., forwarding two plants of Durian from Mr. Edwards, Collector of Customs at Rangoon.

14. From Messrs. Grindlay and Co., acknowledging receipt of Bill for £40, to be at the disposal of Mr. A. H. Blechynden.

For all the above presentations and communications the thanks of the Society were accorded.

(*Saturday, the* 11*th of November*, 1854.)

W. G. Rose, Esq., Senior Member present, in the chair.

The proceedings of the last general meeting were read and confirmed.

The following gentlemen, who were proposed at the meeting, were duly elected Members :

Lieutenant W. J. Gray; W. S. Hudson, Esq.,; Lieutenant F. G. Eden; and Lieutenant A. K. Comber.

The names of the following Gentlemen were submitted as desirous of joining the Society:—

C. N. W. Begbie, Esq., Merchant, Moulmein,—proposed by H. G. French, Esquire, seconded by Dr. C. Huffnagle.

Edward Harcourt Longden, Esq., Agra,—proposed by W. Anderson, Esq., seconded by S. H. Robinson, Esq.

W. H. Poe, Esq., Solicitor, Calcutta,—proposed by W. G. Rose, Esq., seconded by R. W. G. Frith, Esq.

The Hon'ble Major General James Low, C. B.,—proposed by A. Grote, Esq., seconded by Dr. H. Falconer.

Presentations.

The following presentations were announced:—

1. Specimens of 5 bundles of Shaws, and a small bundle of 2 kinds of Shaw Rope. *Presented by Lieutenant F. W. Ripley.*
2. Sample of Jute grown in the Le'Mroo River. *Presented by Lieutenant F. W. Ripley.*
3. Samples of Cloth, Thread, and Cleaned Cotton, prepared from a successful cultivation of American Cotton seed at Shahpore. Also specimens of cloth, floss, and fancy needle work, made from the fibre of the Muddâr plant dyed at Shahpore. *Presented by Major G. E. Hollings.*
4. Sample of Fibre from a jungle plant in Midnapore. *Presented by G. F. Cockburn, Esq,.*
5. A plant of *Raphostemma pulcherrima*. *Presented by B. Warwick, Esq.*

Reports.

The Report of the Sub-Committee appointed to consider the project of the Chief-Magistrate, for converting the ground enclosed by the Race Course into a public Garden, the consideration of which was postponed from last general meeting, was then brought forward. After some discussion, it was moved by Mr. Jos. Agabeg, seconded by Mr. Jas. Hill, and resolved:—

"That in consequence of the paucity of Members present at this Meeting, the consideration of the question be again postponed till next General Meeting."

The Acting Secretary next reported to the Meeting a loss of about 150 Rupees sustained by the Society, being the value of 2 cases of American Cotton and Tobacco seed ordered from Mr. D. Landreth in January last to be sent from Philadelphia *viâ* Southampton. The cases were forwarded from England in the Ship *Maranon,* wrecked at the Sand Heads about a month since, and were not insured. Upon which it was :—

Proposed by Mr. W. G. Rose, seconded by Mr. R. Blechynden, and resolved,—" that in future *all* supplies of seeds for the Society shall be insured against sea risk."

The Gardener's Monthly Report for October, was then read. Mr. McMurray writes :—

" In continuation of my Report for September last, I have now the pleasure to forward you a tabular statement of the result of the Cape vegetable seeds for 1854, from which it will be seen that the average is rather more than seventy per cent, which may be deemed a fair produce.

Mr. J. Carter's packet, containing eighty-six kinds of English flower seeds, were sown on the 25th October, in gumlahs, and placed in the Conservatory, of which seventy-six sorts have germinated freely. The ten kinds not yet up are not a sufficient length of time in the soil to enable me at present to offer an opinion on the quality of the seed, but I will refer to them in my next report.

The two kinds of Chinese fibre-yielding plants called in that country 'Tuck-ma' and 'Tung-ma,' of which seed was received from Mr. Fortune in February last, have turned out to be the same kind of plants as the wild 'Petaree' (or *Sida Asiatica*) and Jute *(Corchorus olitorius)* of Bengal. The *Sida rhomboidea* yields a fine description of fibre, as will be seen from the small quantity prepared in the Garden and forwarded for laying before the present meeting, which may be considered equal to in every way, if not better than. the finest description of flax fibre ; and from the robust habit of the *Sida Asiatica* in its jungly state, and the thickness of the bark, there is every reason to believe the plant would produce an abundance of fibre if brought under careful cultivation. The plant is now ripening its seed, of which a quantity will be gathered for sowing a plot of ground in the garden at the commencement of the next rainy season, so as to find out its capabilities as a fibre yielding plant.

The old stoles of the Rheea plantation growing along the west boundary of the Garden are now flowering very freely, from which it is to be hoped a quantity of seed will ripen or come to maturity for issue ; in addition to this a large number of cuttings of the Rheea plant have been propagated, and are now ready for issue to the members.

The trial sowing of the Chinese cabbage oil plant yielded one hundred per cent., and germinated very freely when sown in the open ground ; but unfortunately the hares have destroyed nearly every plant although protected by netting.

Captain Weston's presentation of twelve bulbs of *Gesnera tubiflora* were received on the 26th October in a healthy condition.

Mr. B. Warwick's contribution of one plant of *Raphostemma pulcherrima was received on the 9th inst. in very good order.*

In conclusion, I have to add that somewhere about one thousand cabbage plants in the Garden may be made available to the Members."

The Report of the Silk Committee on the specimen of Raw Silk received from Mr. H. Cope, Lahore, manufactured there from cocoons reared on the spot, and laid before the August meeting of the Society, was then read as follows:—

"I have carefully examined the sample of silk, consisting of four skeins, one of which I have opened to enable me to examine it thoroughly. It is a very beautiful sample in every respect, about equal to the best French or Italian Silk, and in the present depressed state of the Silk market at home, worth about 20 shillings per lb. in London.

Wm. G. Rose."

"On the 4 skeins of the Lahore Agricultural and Horticultural Society's Raw Silk, grown and manufactured at Lahore, (see Mr. Henry Cope's letter, August 8, 1854, and Secretary Calcutta Agricultural and Horticultural Society's letter, August 30, 1854.)

I find this Silk very fine, very even, very clean, and very strong, in good fair condition, and of lively pale yellow colour.

In its manufacture it resembles the Europe made Silks, and would rank with them in value.

In manufacturing raw silks attention should be given to the production of those of more full body, as well as of the more fine; the demand is often changing for silks of the various kinds of fineness.

Joseph Willis."

The next report was that of the Cotton Committee on the specimen of Cotton grown in the Society's Garden from seed from Mr. Seabrook's plantation in Eddesto Island, Charleston, South Carolina, which estate produced a sample of Cotton which gained a prize at the London Great Exhibition.

The Committee report as follows on the sample, which was laid before the Society at their September Meeting:—

"This Kupass is a beautiful specimen of Sea Island Cotton grown in the Society's Garden. It is extremely fine and silky, whilst the fibre is long and strong, and the complexion bright and excellent.

I have seen many fine specimens of S. I. Cotton grown in this country and elsewhere, but nothing to equal this, and if the Society could import a few maunds of this identical seed cotton, it would be worth while to cultivate a few beegahs of it in the neighbourhood of Calcutta, and thus give it a fair trial, even on an increased scale of expenditure, for there cannot, I think, exist a doubt that this cotton, if properly picked and cleaned, would fetch at home a price of 24*d.* to 30*d.* per lb., which should be amply remunerative.

Calcutta, 4*th November,* 1854. James Cowell."

"On the three heads of Kupass produced in the Society's Garden from Sea Island Seed of Mr. Seabrook's plantation in Eddisto Island, Charleston, South Carolina. Under-Secretary's letter, September 14, 1854.

These three heads of Kupass present a cotton of singularly superior character and quality in all respects, and it would doubtless command the highest prices of the best Sea Islands in England.

The pods appear to me to be rather limitedly furnished with fibre; but if on a proper estimate, if it could be made by the Gardener, it could be shewn that the cultivation, &c., could be accomplished maund per maund at a cost of three or four times that of the common country cotton, there would still remain a very large margin of profit for the adventurer.

It would be well worthy of trial in suitable marine soils of India, and where the climate also might be found most congenial.

JOSEPH WILLIS."

"I have examined the small quantity of Kupass, raised in the Society's Garden from the seed presented by Mr. J. L. Nash, and I quite agree with all that Mr. Willis states in his report respecting its extraordinary fine quality; as regards the limited quantity of fibre adhering to the seed, noted by Mr. Willis, I believe the Sea Island description of seed is never entirely covered with fibre, and I find this specimen *more* covered than any which has come under my observation, raised from that kind of seed in India.

It would be a mine of wealth to this country, if such cotton could be produced in quantity: its great market value would admit of a large outlay in its production.

WM. HAWORTH."

3rd November, 1854.

Communications on various subjects.

The following communications were then read :—

1. From the Secretary of the Society, dated Perth, 25th August last, and addressed to the Committee appointed by the Society for drawing up instructions to Mr. Blechynden respecting his travelling on the Society's account. Mr. Blechynden writes that he would be unable to carry out the wishes of the Committee to the extent laid down, he having taken his passage to return to Calcutta by a vessel advertized to leave on the 15th October; but intimating his desire to meet the wishes of the Society so far as his present imperfect state of health and the brief remaining period of his stay would admit. He also stated it was probable the charge for his travelling and other incidental expences at home would not exceed £25.

With reference to the above letter, the Acting Secretary mentioned that the Council had advised that the balance of the £100, remitted to Messrs. Grindlay and Co. for Mr. Blechynden's travelling expences, after payment of the expences actually incurred by him, should be made over to Mr. James

Carter in part payment of the Society's annual supply of flower seeds. This was agreed to by the Meeting.

2. From Mr. James Carter, London, with invoice of 2 cases choice bulbs and plants, ordered for the Society by Mr. Blechynden, value £16-13-6. The Acting Secretary mentioned that these had arrived in good order; the plants sent to the Society's Garden, and the bulbs advertised for distribution.

3. From R. Fortune, Esq., dated Shanghai, 30th September, 1854, advising despatch of Pœony plants.

4. From G. G. Mercer, Esq., Futtyghur, objecting to the amount of premia for Agricultural Essays being taken from the vested funds of the Society, and proposing it should be deducted from the expenditure on Horticulture.

The Meeting were of opinion that Mr. Mercer's proposal came too late for further notice, the matter alluded to having already been disposed of.

For all the above communications and presentations, the best thanks of the Society were accorded.

(Saturday, the 9th of December, 1854.*)*

Lieutenant-Colonel W. Sage, Senior Member present, in the chair.

The proceedings of the last General Meeting were read and confirmed.

The following gentlemen, who were proposed at the last general meeting, were duly elected Members:—

C. N. W. Begbie, Esq.; Edward Harcourt Longden, Esq.; H. H. Poe, Esq.; and the Hon'ble Major-General James Low, C. B.

The names of the following gentlemen were submitted as desirous of joining the Society:—

Lieutenant Hichens, Bengal Engineers,—proposed by Major Western, seconded by Major W. Abercrombie.

Rev. W. H. Boyle, Chaplain, Sealkote,—proposed by Major G. E. Hollings, seconded by Lieutenant-Colonel W. Sage.

C. F. Hudson, Esq., Officiating Political Assistant to Commissioner of Assam, Cherra Poonjee,—proposed by S. H. Robinson, Esq., seconded by R. W. G. Frith, Esq.

George Meares, Esq., Indigo Planter, Sindoree, Jessore,—proposed by W. G. Rose, Esq., seconded by S. H. Robinson, Esq.

Presentations.

The following presentations were announced:—

1. Sample of Cotton from Shahabad. *Presented by W. H. Poe, Esq., through W. G. Rose, Esq.*

2. A plant of the Assam Room plant, from the Reverend E. Higgs, of Debroghur. *Presented by W. S. Leckie, Esq.*

3. A specimen of Wood from New Zealand. *Presented by S. F. Seymour, Esq.*

4. Samples of Fibre from Cherra Poonjee. *Presented by F. Skipwith, Esq.*

5. A plant of *Cobœa scandens*. *Presented by B. Warwick, Esq.*

6. Report of the Bombay Chamber of Commerce for the year 1853-54, *Presented by the Chamber.*

7. Some Potatoes and Wheat from California. *Presented by Mr. Ladd.*

8. A bundle of dry stalk of the plant from which the Midnapore Fibre sent by him last month is prepared. *Presented by G. F. Cockburn, Esq.*

Reports.

The Report of the Sub-Committee appointed to consider the project of the Chief Magistrate for converting the ground enclosed by the Race Course into a public garden,—which was postponed from last Meeting, was again brought forward. Upon which it was proposed by Baboo Peary Chand Mittra, seconded by the Chairman, and resolved :—

"That while the legitimate objects of the Society are not carried out to the extent to which they ought to be for want of funds, it cannot without neglect of those objects contribute towards the formation of a public garden in the Race Course so large a sum as 2,000 Rs., the expence of which ought to be borne by the community of Calcutta, for whose recreation the garden is specially intended."

It was then resolved—"That the Acting Secretary be requested to write a reply to the Government of Bengal on the subject of the public garden, to the effect that the Society do not conceive that the opinion called for from them is one which could properly come from the Agricultural and Horticultural Society, and that it was decided at this Meeting that the funds of the Society could not legitimately be disposed of for the furtherance of the objects proposed in the Chief Magistrate's letter."

A report from the Council was next submitted founded on a further letter received from Col. Jenkins, Commissioner of Assam, on the subject of renewing the seed potatoes in the Cossyah hills. Dr. Falconer having recommended that the crop should be entirely renewed by the importation of a sufficient quantity of American seed potatoes from California, Col. Jenkins with reference thereto in his reply to the Acting Secretary, dated November 12th last, writes as follows :—

"It would be desirable, I think, for the Society to make arrangements for continual supplies, and to some extent, for all the other great potato countries will be glad to get new varieties and fresh seed as well as Cherra."

On this the Council report their opinion that a sum not exceeding 500 Rs. should be devoted to this purpose by the Society, upon which it was—

Resolved.—That the adoption of the recommendation of the Council regarding the supply of seed potatoes from California be postponed, and that the Acting Secretary be requested to report on the qualities of the potatoes grown in India at the next Meeting, with a view to selecting, if possible, such descriptions as may be deemed the best for seed."

A report from the Council was next brought forward, founded on the minute, submitted to the last Meeting, of Mr. James Cowell, Member of the Cotton Committee, to whom was referred the sample of Cotton grown in the Society's garden from seed, the produce of Mr. Seabrook's plantation in Charleston, South Carolina. Mr. Cowell, with reference to the very superior quality of this Cotton, remarked that "if the Society could import a few maunds of this identical seed, it would be worth while to cultivate a few biggahs of it in the neighbourhood of Calcutta, to give it a fair trial." On which the Council recommended to this Meeting to sanction the expenditure of a sum not exceeding 250 Rs. for the purchase of seed for that purpose.

Upon which it was moved by Mr. S. Douglas, seconded by Baboo Peary Chand Mittra, and resolved—"That Mr. J. Lambert Nash be requested to assist the Society in procuring seeds of Cotton of the same description as he presented to the Society last December, and that a sum of money not exceeding 250 Rs. be placed at the disposal of Mr. Nash for this purpose, and that this motion be again submitted for confirmation as usual at the next monthly Meeting."

The Report of the Garden Committee, approved by the Council on the supplies of Horticultural seeds for next season, was then read and passed. They recommended that the supplies should comprise the usual supply of Cape vegetable seeds from Messrs. Villett and Sons—the usual supply of English flower seeds from Mr. Carter, one half the usual supply of American seeds from Mr. D. Landreth, and one-half the indent of Edinburgh seeds from Messrs. Lawson and Sons, suggested by Mr. Blechynden.

The Report of the Prize Essays Committee, as approved by the Council, was also read and adopted by this Meeting. The Report is as follows :—

"Report of the Committee of the Agricultural and Horticultural Society appointed for selecting the subjects, and deciding on the amount of reward to be offered for Agricultural Essays.

1. The Committee reported to the Council Meeting on 8th November last, recommending that a premium of 1,000 Rs. should be offered for the best Essay on the Fibres of India: upon which the Council, with reference to information afforded them by Dr. Falconer, that a work on the same subject was passing through the Press at home, referred the matter back to the Committee for further consideration.

2. The Committee now beg to recommend that the premium for an Essay on Fibres should be withdrawn for the present, and that two premia, of 500

Rs. each should be offered for Essays on the next two subjects selected by them at their last Meeting, viz. : No. 2. On the relative cost and production of the various Oil Seeds of India suitable for export No. 3. On Date tree cultivation in Bengal.

3. The Committee also beg to submit a list of rules of competition for the Prize Essays to be adopted by the Society when advertising the premia to be offered.

(Signed) PEARY CHAND MITTRA,
" A. GROTE,
" RAMGOPAUL GHOSE,
" WM. HAWORTH."

Rules of competition for Prize Essays.

1. The Essays must be of a practical character, containing the results of the writer's own observations or experiments, and not merely a compilation from books.

2. Drawings constructed to a stated scale shall accompany writings requiring them.

3. All competitors to enclose their names in a sealed cover, superscribed only with their motto and the subject of the Essay.

4. The President or Chairman of the Council shall open the cover on which the motto designating the Essay to which the premium has been awarded is written, and shall declare the name of the author.

5. The Chairman of the Prize Essay Committee shall alone be empowered to open the motto paper of every Essay *not* obtaining a premium that he may think likely to be useful for the Society's objects, with the view of consulting the writer confidentially as to his willingness to place such Essay at the disposal of the Committee of papers for publication.

6. The copyright of all Essays for which a premium has been awarded shall become the property of the Society for publication in their journal or otherwise, unless the author shall publish it on his own account within six months from the date of the premium being awarded.

7. The Society are not bound to award a Prize, unless they consider one of the Essays deserving of it, but may award such part of the premium as the Essay may be adjudged to deserve.

8. In all reports of experiments the expences shall be as accurately detailed as practicable.

9. The Calcutta bazar maund of 80 sicca weight to the seer, and the Company's Rupee, are the only weight and currency in which calculations are to be made.

10. No prize shall be given for any Essay that has already appeared in print.

11. All Essays to be addressed to the Secretary of the Society, Metcalfe Hall.

The Report of the Cotton Committee, on samples of Cotton grown by Mr. J. H. Prinsep at Buttala, was next submitted as follows :—

"In reply to your note of May, 1854, sending me Cotton musters, as well original letter from J. H. Prinsep, Esq., relating to this Cotton, I have to observe.

From its appearance the fibre is fine and very silky ; its staple is of fair average for this presidency ; it is pretty strong, and adheres slightly to the seed.

These small parcels to test by, generally grown upon well selected soil, and well watched in culture, can but give a very imperfect idea of bulk or secure a knowledge of a true value in the English market ; but I regard the quality adapted for spinning purposes there.

EDWARD SMITH."

"I concur with Mr. Willis in his minute as to the merits of this sample of Cotton, the fibre being remarkably soft, silky, long and flexible for a cotton of three years acclimation in this country. It is also of fair strength, and the seed well covered with wood, which is easily detached, whilst it does not possess in the smallest degree the coarse, rough and wiry nature of country grown cotton generally. It would be satisfactory to know the original stock of this cotton, and Mr. Prinsep would oblige the Committee by discovering this, if possible. Although, from a close examination of the seed, it bears some of the properties of the Upland or New Orleans varieties, yet it differs in other material respects, the fibre being more long silky, soft and pliant. It appears to me to be one of the green seed or short stapled cottons, but changed and improved by soil or climate, or perhaps both together.

CALCUTTA, 22*nd Nov.*, 1854. JAMES COWELL."

"Now this cotton in seed would appear to be of the green furred seed, and thus akin to the Upland Georgia or New Orleans Cottons.

It may have been of what is termed Petty Gulph kind.

If it should have originated from the black seed or Sea Island stock, then it has, as would be likely, changed its nature from its growth in the interior, and acquired, especially as its seed exhibits, the character of the N. American Uplands Cotton.

The seed is of good bold size and remarkably well covered with cotton fibre.

The fibre is very fine, good length and good strength, silky and flexible ; and it is in all respects well suited for the Europe machine spinner.

I am pleasingly surprised to find that after three years of acclimation in the Punjab, I have *not* to record that this cotton has acquired the harshness,

ness and shortness of fibre generally found in the Cotton indigenous to a large portion of the Cotton districts of Upper India.

And be it not forgotten that this specimen has had the advantage of a changed site of growth, from Sealkote to Battala.

J. Willis."

The Gardener's Monthly Report for November was then submitted. Mr. McMurray writes as follows :—

"In continuation of my report for the month of December last on Mr. J. Carter's English flower seeds of this season's importation, I have now to add that six out of the ten kinds of seeds then reported not up have since germinated, which leaves at present only four sorts out of the eighty-six kinds not germinated. A list of the whole seeds received is now forwarded for laying before the Members wherein the date of sowing, germinating, kinds of seed which are bad, &c., will be seen.

The row of Cocoanut trees grown along the north belt of the garden have set a large number of fruit this season, and the young plantation of Singapore Betel and Cocoanut trees grown along the west boundary have made a healthy growth. The 231 Singapore Betelnut seed presented to the Society in September last by J. Agabeg, Esq., have germinated.

The American Apple and Pear trees are doing well, and have flowered again this season, but set no fruit.

The several kinds of Peach trees under cultivation in the plot of ground which was thoroughly under surface drained in 1852 have done exceedingly well during the rains, and are now densely set with fruit bearing buds for next year's crop.

The Cabul and China Walnut, English Oak, Cape Holly, and Irish Filbert trees are all in good health,.

The Rev. E. Higg's presentation of one room dye plant from Upper Assam was received in good order on the 17th November. This plant is a '*Justicia* species,' or belongs to that natural order, and is very much like the Chinese blue dye plant or '*Justicia* species' received from Mr. Fortune in March last. There is every probability that the Chinese are indebted to Assam for their blue dye plant as I observed in a late number of the *Gardener's Chronicle*, now in your office, an article written by Mr. Fortune wherein he stated to the effect that the Chinese plant was tender, and that it grows most luxuriantly during the summer, and is no doubt very productive, having evidently been introduced from a more southern latitude. Now should this be the plant, as I have every reason to believe it is, here we have the far-famed blue dye plant of China growing side by side with the Chinese grass cloth plant in the jungles of Assam. The article I have referred to in the *Gardener's Chronicle* by Mr. Fortune is well worth publishing in the Society's journal, or even with the monthly report in the Calcutta papers.

The four kinds of bulbous plants received from Mr. J. Carter on the 11th November were in good health, but the box containing ten kinds of plants in pots were found all dead but one, and that nearly so, the name of which is '*Rondeletia speciosa major.*' The whole of these plants seemed too young to live during a six weeks' passage without water.

Mr. G. Bartlett's presentation of five nectarine and one rose plants were received on 14th November in very good health.

Mr. G. Macleod's contribution of one Gesneria and one Clematis plant were received on the 14th November in a healthy state.

Mr. J. Carter's Victoria pea, received on 17th November, has only yielded seven per cent sown in a gumlah, and has come up very badly in the ground.

Mr. C. B. Stewart's presentation of ten Araucaria plants, twenty-one kinds of Texian and sixteen sorts of English flower seeds, were received on the 20th November in very good order.

Mr. W. Stalkartt's contribution of one new species of Combretum, was received on the 29th November in a healthy state."

The Flax Committee's Report on samples of Bast received from Major Phayre, Rangoon, was then submitted. (See page 142.)

Communications on various subjects.

The following communications were then read —

1. From C. F. Hudson, Esq., dated Cherrapoonjee, 25th November, referring to correspondence with Col. Jenkins respecting the renewal of Potato crop, and requesting 10 mds. of California potatoes to be sent to him.

2. From Messrs. Grindlay and Co., dated London 19th October, acknowledging receipt of 60£ Bill for Mr. Blechynden's travelling expenses.

3. From Messrs. Grindlay and Co., dated London, 19th October, with Bills of Lading per *Alfred* on 5 packages wire fence for the Society.

4. From Mr. James Carter, dated London, 24th October, with Invoice of 300 rose slips, value £3-17-6.

5. From A. H. Blechynden, Esq., dated London, 25th October, acknowledging receipt of letter of 4th September, and advising despatch of Hop and American Flax seed, also mentioning parties who would experiment on Indian Flax and Rheea Fibres, and report results to the Society.

6. From G. F. Cockburn, Esq., sending a bundle of dry stalk of the plant from which the Midnapore fibre sent by him last month is prepared.

7. From Dr. H. Falconer, reporting on a sample of Gutta Percha, forwarded by Mr. C. N. W. Begbie, of Maulmain.

For all the above presentations and communications the thanks of the Society were accorded.

Report of the Agricultural and Horticultural Society of India, January, 1855.

The Council, in submitting their Report of the operations of the Society for the past year, commence as usual with a summary of the state of the subscription list. This they have much pleasure to record is satisfactory, shewing a total on 31st December of 645 members, of whom 521 are resident or paying, 38 Life Members, 71 absent, and 15 Honorary, Corresponding, and Associate Members. The list as made up to 31st December, 1853, shewed a total of 618 members, of whom 508 were on the resident or paying list, 39 Life Members, 54 absent, and 17 Honorary, Corresponding, and Associate Members. The increase therefore, as compared with the list on 31st December, 1853, is a total of 27 members, and an increase of 13 in the number of resident or paying members: but for the number of members absent from India at this date being unusually large, viz. 71, or 17 more than were absent at the corresponding date of the last 2 years, the comparative state of the resident paying list would have been still more satisfactory. The total number of new members enrolled during the year is 72, whilst on the other hand the number of resignations has been 32, of deaths 9, and of names struck off as defaulters for non-payment of arrears 4, total 45, leaving the nett increase as above stated.

The following is the classification list of members at present:—

CLASSIFICATION.	In 25 former years.	In 1846.	In 1847.	In 1848.	In 1849.	In 1850.	In 1851	In 1852.	In 1853.	In 1854.	Gross Total.	Total real number at close of 1853 after deducting lapses.
Honorary Members, ...	11	1	0	1	0	0	0	1	0	1	15	9
Associate Members, ...	2	0	0	0	0	1	1	0	0	0	4	2
Corresponding Members, ..	0	1	0	0	0	0	1	1	1	0	4	4
Civilians,..	232	13	15	22	8	10	22	16	18	6	362	149
Merchants and Traders, ..	201	14	12	13	10	14	20	12	5	16	317	110
Indigo and other Tropical Agriculturists, ...	190	15	6	5	1	9	19	13	10	7	275	91
Military Officers, ...	160	10	11	11	11	9	34	18	22	19	305	146
Medical Officers, ...	80	0	2	3	5	7	4	5	3	4	113	34
Asiatics, ...	63	2	14	5	6	9	8	8	8	5	128	49
Clergy, ...	14	1	0	0	0	2	1	1	1	1	21	6
Law Officers, ...	40	1	0	0	6	4	6	3	1	3	64	23
Miscellaneous, ...	9	0	2	0	2	2	6	0	0	10	31	22
	1002	58	62	60	49	67	122	78	69	72	1639	645

[illegible] twelve months, the Council regret having to record the name of Dr. N. Wallich, formerly Superintendent of the Botanical Garden, and since his retirement from India in April, 1846, one of the Society's most valued corresponding members. The Society have already recorded their deep sense of their loss by a vote of respect to his memory passed at their July meeting.

Another old member and invaluable promoter of the objects of the Society, Mr. Willis Earle, has been removed by death from amongst us, and a like tribute of respect to his name has been voted.

The other members deceased during the year are Mr. G. T. F. Speede, a zealous Horticulturist, and author of several works on the subject of Indian Gardening; Mr. W. Storm, formerly a Vice-President of the Society; Baboo Motelall Seal; Brigr. T. Palmer; Mr. J. Cearns; Major W. H. Nicholetts, and Mr. Stephen Mornay, an intelligent and industrious Agriculturist in Assam.

Respecting the important matter of finance, the Council are again able to report favorably of the position of the Society. The annual statements of the receipts and disbursements, vested fund, arrears of subscription and liabilities, are submited herewith. The total receipts during the year amount to Rs. 28,562-15-1, adding to which the balance in hand at the close of 1853, viz. Co.'s Rs. 2,347-5-2, shews the total of receipts as per statement Co.'s Rs. 30,910-4-3. The disbursements, during the year amount to a total of Rs. 29,902-13-4, which deducted from the receipts, leaves the balance of cash in the Bank of Bengal, with the Government Agent, and with the Secretary on 1st instant, Rs. 1,007-6-11.

The amount of members' subscriptions realized during the year it will be seen is Rs. 15,450-14-6, being considerably less than last year, during which the amount collected was Rs. 17,913-8-0,* but about the same as during 1852, when the amount was Co.'s Rs. 15,534-9-9. The total of miscellaneous receipts for seeds sold, grafts, &c., delivered from Nursery Garden, and proceeds of Journal sold, &c., &c., amounts to Rs. 2,603-1-6, being about

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* This however, includes Rs 1,200 from 3 members, who consolidated their subscriptions in that year.

267 Rs. less than in 1853, a considerable amount remaining due to the Society under this head, being Rs. 1,051-4-0 for seeds sold alone, the delay in realizing which during the past year is accounted for by the unusually late arrival of the Cape and English seeds.

The vested fund, it will be observed, now stands at Rs. 20,333-5-4 in Company's Paper, or 2,000 Rs. less than at the end of 1853, that amount having been sold out in January last year, to meet an *advance of salary to the Society's Secretary, Mr. Blechynden, on the occasion of his going to England on leave for twelve months for the recovery of his health.*

On a comparison of the disbursements with those of last year, it appears that in 1853 the total thereof amounted to Rs. 29,130-7-8, and deducting therefrom the extraordinary item of Rs. 5,070-2-6, the Government prize for a Cotton-cleaning machine, left the nett ordinary disbursements of the Society for that year at Rs. 24,060-5-2. In 1854, the total disbursements amounted to Rs. 29,902-13-4, and deducting therefrom the Rs. 1,000 charged to the account as part repayment of a loan from the Bank of Bengal, leaves the nett expenditure at Rs. 28,902-13-4, or Rs. 4,842-8-2, more than in 1853: this arises principally from the additional expenditure under the head of Establishment, to cover the allowance to an Acting-Secretary during Mr. Blechynden's absence; the expence of one Part of the *Journal* more than last year, and the more liberal allowance in prizes for Horticultural Shows, to be referred to hereafter.

The total liabilities of the Society, for seeds, &c., received in 1854, and balance of a loan from the Bank of Bengal, amount to Rs. 8,892; but this it will be seen is more than counterbalanced by the amount due for arrears of subscription, and for seeds, grafts, &c., supplied, amounting in all as per statement, to Rs. 9,356-12-0,

The Society has continued its active measures, for the encouragement of Horticulture, by holding public shows of vegetables, fruits, and flowers. Of these four were held from January to April, and one in December last, and the Judges in their reports thereon announce a steady progressive improvement in the vegetable department; but the exhibitions of flowers were not on the whole judged to be equal to those of some former years; this was in some measure attributed to the failure of the English flower seeds supplied to the Society by Mr. J. Carter in 1853, which tended especially to curtail the produce of annuals in the vicinity of Calcutta. The cultivation of Orchids however seemed, from the numbers and new varieties of those beautiful plants brought forward, to be greatly and successfully on the increase. In the five exhibitions, the Society awarded a total of Rs. 1,431 in prizes, viz.: Rs. 1,036 for fruits and vegetables, and Rs. 395 for flowers, being above 50 per cent. more than was distributed in 1853; the total sum awarded in that year being 919 Rupees.

Whilst the Society has so liberally encouraged Horticultural pursuits however, their attention has also been directed in several ways to the improvement of the Agricultural resources of the country. Besides the importation of cotton and tobacco seeds from America, and their distribution to various quarters of India, especially to Assam, the Society has endeavored to incite an interest in the improvement of the various valuable fibre-yielding plants of the country, by publishing in their proceedings a number of reports by their Hemp and Flax Committee on fibres submitted to them,* and by offering a premium of Rs. 1,000 for the most successful cultivation of the Rheea plant and manufacture of its fibre. It has also recently advertised its offer of two premia of Rs. 500 each for the best essays on select Agricultural subjects, to be submitted to it in 1855, intending to continue the same offer annually. There would seem to be a growing conviction amongst its members, that the Society by these and kindred measures may effect a great deal more than it has hitherto done for the improvement of Indian Agriculture.

In furtherance of the same objects, the Society also designed to avail of their Secretary Mr. Blechynden's leave of absence to England, by instructing him to visit the principal places of Great Britain, France, and Belgium, where he could witness, and collect information on the most recent agricultural processes in use, more especially

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* The Society has also caused the more valuable of the papers on fibres submitted to them to be translated and published in the *Indian Agricultural Miscellany.*

on the cultivation and manipulation of flax and other economic fibres, and the sum of £100 for his travelling expences, and an extension of leave for 3 months beyond the year's absence originally allowed him, were voted by the Society: but the Council regret to report that Mr. Blechynden's continued ill health, and other causes, have only admitted of his meeting the Society's views very partially.

The Society has during the past year imported for the use of its members the usual full supplies of American vegetable seeds from Mr. D. Landreth; Cape vegetable seeds from Messrs. Villet and Son, and English flower seeds from Mr. J. Carter. The two latter supplies appear to have given entire satisfaction to the members, but the supply from America has resulted very indifferently, and several of the more important kinds have entirely failed. The disappointment occasioned by this failure to many of the distant members has been great, and the Society decided to mark their sense of it by ordering for next season's supply only one half the quantity usually invoiced by Mr. Landreth; and to supply the deficiency, have directed another trial shipment of about half the usual quantity furnished to members to be sent by Messrs. Lawson and Son, the well known seedsmen of Edinburgh, who have promised to use their best exertions to provide an early and superior selection. The Society has also through the agency and zealous co-operation of Mr. R. Fortune, in China, procured during the year a number, in all twelve packages, of valuable contributions from that country, both seeds and plants, including the Chinese green dye plants (a good crop of which is now growing in the Society's Garden), the *Chamærops* or Hemp Palm, the *Salisburia*, the soap bean tree, the Funereal Cypress, the wax insect tree, and many other valuable, and some quite new, species of useful and ornamental vegetation. Most of these have succeeded in the Society's Garden, and will it is hoped, in due time, form a nucleus for diffusing many valuable plants throughout the country. The sum of Rs. 500 placed at Mr. Fortune's disposal by the Society, in December, 1853, has thus proved a most valuable investment. Liberal presentations have also been received from several members, including peach grafts from F. A. Glover, Esq., Moteharree; tobacco and rice seeds from

Arracan from Lieut. Ripley, and through the late Mr. Willis Earle; and various contributions from Sir L. Peel, Messrs. C. J. Simons, J. Agabeg, B. Warwick and others.

Enriched by the above contributions, as also by the importation of a large supply of peach and nectarine grafts from Dr. Jameson at Sahurunpore, the Society's Garden, under the able superintendence of Mr. McMurray, and with the addition of a new conservatory, and other improvements, has greatly advanced in variety of productions and general usefulness; this is evinced by the comparative amount realized by sale at reduced prices of fruit grafts, &c., during the year, being Co.'s Rs. 672-10-0, against Co.'s Rs. 351-5-9 in 1853.

Before leaving the subject of the Nursery Garden, the Council must not omit to record the measures the Society has taken for improving the Garden School. This had hitherto been available only for the most rudimentary kind of native education to the ten or twelve boys employed in the Garden. The Society, by enlarging the accommodation, appointing an additional school-master, and placing the supervision of the school under the Rev. Mr. Long, who has kindly promised to take an interest in its progress, expects to educate at least double the above number of boys, and in such a manner as to make them available as intelligent and efficient malees, a class of persons of which great want is felt at present: the whole expence of this improvement is estimated at Rs. 32 per month.

Two Parts of the Society's *Journal*, completing the 8th Volume, have been published during the year, and Part I of Vol. IX. is in the press. Of the *Agricultural Miscellany* two parts, viz., 3 and 4 have also been published, and the Council have much satisfaction in observing the increasing popularity of this little work, due no doubt in great measure to the good judgment and ability displayed by the Committee who manage it, in the translation and selection of matter usefully adapted to its readers. The great demand for the work has called for a reprint of 500 copies of Part I, and the Society has decided that a charge of four annas per number, being about the cost price, may be fixed upon it for the future, without fear of contracting its circulation.

Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India from 1st January to 31st December, 1854.

RECEIPTS.

	Co.'s Rs.					
From Members, Subscriptions collected during the year,				15,450	14	6
Government Annual Donation,	1,045	0	0			
Ditto, monthly allowance for 12 months at 135-13-6 per month,	1,630	2	0			
Hon'ble Sir Lawrence Peel, annual donation,	400	0	0			
The Most Noble the Marquis of Dalhousie, annual donation, for the year 1854,	500	0	0			
				3,575	2	0
Bank of Bengal, a loan on deposit of 6 Company's papers, (Rs. 4,000)				3,800	0	0
Government Agent proceeds of 4-5 per cent. Company's papers sold,				2,000	0	0
Accruings of interest on fixed assets,				735	13	1
Maha Rajah of Gwalior on account of glazed cases,	200	0	0			
Ditto on account of freight for glazed cases of plants,	198	0	0			
				398	0	0
Proceeds of Sugar-cane delivered from the Nursery Garden, including cost of packing,	80	3	6			
Proceeds of fruit-tree grafts delivered from the Nursery Garden,	562	6	6			
Ditto, of 3 mds. of tobacco leaves do.	30	0	0			
Ditto, of a proportion of surplus Cape and American vegetable and English flower seeds of 1853-54,	1,498	3	3			
Ditto, of German and French flower seeds,	102	0	0			
Ditto, of bulbs,	15	6	0			
Ditto, of copies of *Transactions* of the Society,	6	0	0			
Ditto, of copies of *Journal* of do.	84	4	0			
Ditto, of copies of *Indian Agricultural Miscellany* sold.	13	9	0			
Ditto, of American cotton seeds on acct. of Mr. D. Landreth,	85	8	0			
Ditto, of old seed boxes,	7	8	0			
Members, amount repaid for postages, pots, and packing charges for seeds, &c.,	42	13	6			
,, Ditto, amount of freight, &c., repaid on boxes of seeds forwarded to their addresses in 1853-54,	75	3	9			
				2,603	1	6
Receipts, Total Co.'s Rs.,				28,562	15	1
By Balance in the Bank of Bengal on 31st December, 1853,	2,196	1	4			
ditto in the hands of Government Agent, ditto,	118	13	1			
ditto in the hands of Secretary on ditto,	32	6	9			
				2,347	5	2
Grand Total Receipts Co.'s Rs.				30,910	4	3

DISBURSEMENTS.

FOREIGN VEGETABLE AND FLOWER SEEDS.		
By Messrs C. M. Villet & Son for Cape garden seeds supplied in 1854,	2,160 0 0	
,, Mr. D. Landreth, towards meeting cost for American garden, cotton and maize seeds supplied in 1853, amounting to Sp. dolrs. 1,550-66, and bal. of his acct. for 1851-52 amounting to Sp. dolrs. 476-21, ...	4,052 2 9	
,, Mr. James Carter, in full of his bill, amounting to £ 251·18 for English flower seeds, supplied in 1853, ...	1,526 15 4	
		7,739 2 1
LIBRARY.		
,, Books purchased during the year for the Library, ...	367 12 11	
,, Binding books during the year, ...	15 5 0	
		383 1 11
PRINTING.		
,, Sundry parties for printing receipts and schedules of prizes for flower shows, &c., &c., ...		131 11 0
MEDALS.		
,, Grindlay and Co. to meet the cost on acct. new dies for gold and bronze medals, ...		742 4 3
JOURNAL.		
,, Bishop's College Press, for printing Parts 4 and 5 of Volume VIII,	957 8 0	
,, Mr. G. H. Stapleton for drawing and lithographing 650 copies of diagrams for the Journal Part 1 of Volume IX., ...	50 0 0	
		1,007 8 0
NURSERY GARDEN.		
,, Ordinary expences incurred on account of the Nursery Garden ,, from 1st December, 1853, to 30th November, 1854, ...	3,334 3 3	
,, Extra ditto, for building a new conservatory, purchase of fruit seedlings for grafting, for pots, &c., ...	634 4 0	
,, Dr. W. Jameson, to meet expenses for forwarding peach grafts,	150 0 0	
,, Grindlay and Co., ditto for wire fence, bell-glasses, &c., ...	303 2 6	
,, Supt. H. C. Botanic Garden, on acct. of Maha-Rajah of Gwalior, for 12 glazed cases, ...	192 0 0	
		4,613 9 9
INTEREST.		
,, Secy. Bank of Bengal, on a Loan of Co.'s Rs. 3,800, ...		82 2 0
BANK OF BENGAL LOAN.		
,, Secretary Bank of Bengal, in part payment of Loan, (Rs. 3,800,)		1,000 0 0
ESTABLISHMENT.		
,, Amount for Establishment from 1st December, 1853, to 30th November, 1854, including a payment of 2,000 Rs. on account to Mr. A. H. Blechynden, on his leaving for England,	8,807 3 6	
,, Mr. A. H. Blechynden, on account of his travelling expenses,	* 1,058 11 3	
		9,865 14 9
PECUNIARY REWARDS.		
,, Prizes to Mallees for vegetables and fruits at the Exhibitions held on the 20th January, 25th February, 14th March, and 23rd December, 1854, ...	1,036 0 0	
Carried over, Co.'s Rs., ...	1,036 0 0	25,565 5 9

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* Only a small portion of this sum has been drawn.

Brought forward, ...	1,036 0 0	25,565 5 9
By Prizes to Mallees for flowers at the Exhibitions held on the 20th January, 25th February, 14th March, 7th April, and 23rd December, 1854, ...	395 0 0	
		1,431 0 0
ADVERTISEMENT.		
,, Advertising in the Calcutta and Up-Country Newspapers notices of General Meetings, of Shows of Vegetables and Flowers, Distribution of Seeds, &c., &c , ...		506 7 3
INDIAN AGRICULTURAL MISCELLANY.		
,, P. S. DeRozario and Co. for printing Parts 3 and 4, Vol. I. of the *Indian Agricultural Miscellany*, ...	143 4 0	
,, Mooktaram Summono for translating and revising most of the papers, &c., for ditto, ...	80 0 0	
		223 4 0
STATIONERY.		
,, Stationery for Office books, &c., and for the use of the office, ..	30 4 0	
,, Brown packing paper for packing seeds, ...	98 3 0	
FREIGHT.		
,, Freight on boxes of seeds, books, &c., sent and received from the Cape of Good Hope, America, &c., ...		594 1 6
METCALFE HALL.		
,, Society's proportion of Assessment on Metcalfe Hall from Nov., 1853, to October, 1854, ...		131 4 0
MACHINERY ACCOUNT.		
,, Messrs. Bates, Hyde and Co. in full of Government prize,	18 0 0	
,, Ditto for a Saw Gin, purchased at cost price Sp. Dolrs., 75, =	150 0 0	
		168 0 0
POSTAGES AND SUNDRY OTHER CHARGES.		
,, Postage on letters, &c., sent and received, and on copies of the Journal, and for petty expences, ...	843 1 0	
,, Extra packermen for subdividing seeds, ...	18 12 0	
,, For expences incurred in putting up a fence round a portion of the Auckland Circus, for superintending the erection of tents for flower and vegetable shows, ...	207 13 6	
,, Presents to Constables for attending at Horticultural and Floricultural Exhibitions during the year, ...	60 0 0	
,, Government Agents Commission, brokerage, &c., charges during the year, ...	25 5 4	
		1,154 15 10
Total Disbursements,	Co.'s Rs.,	29,902 13 4
,, Balance in the Bank of Bengal on 31st December, 1854, ...	698 6 8	
,, Ditto in the hands of Government Agent on ditto, ...	269 10 6	
,, Ditto in the hands of Acting Secretary on ditto, ...	39 5 9	
		1,007 6 11
Grand Total, Co.'s Rs.,		30,910 4 3

MEMORANDUM.

Disbursements.

To Amount of Disbursements during the year 1854, as per Statement, ...				29,902	13	4
,, Balance in the Bank of Bengal on 31st December, 1854, ...	698	6	8			
,, Ditto in the hands of Government Agent on ditto, ...	269	10	6			
,, Ditto in the hands of Actg. Secretary on ditto,	39	5	9			
				1,007	6	11
Total, Co.'s Rupees,				30,910	4	3

Liabilities.

Amount due by the Society for American vegetable, &c., seeds in 1854, ... Sp. Dolrs., 1,651-68 0=	3,302	0	0
Ditto for English flower seeds, bulbs and rose slips, amounting to, ... £279 1 0=	2,790	0	0
Balance due to the Bank of Bengal on deposit of Company's Papers, ...	2,800	0	0
Co.'s Rupees,	8,892	0	0

Receipts.

By Amount of Receipts during the year 1854, as per Statement, ...				28,562	15	1
,, Balance in the Bank of Bengal on 31st December, 1853, ...	2,196	1	4			
,, Ditto in the hands of Government Agent on ditto, ...	118	13	1			
,, Ditto in the hands of Secretary on ditto, ...	32	6	9			
				2,347	5	2
Total, Co.'s Rupees,				30,910	4	3

Dependencies.

Amount invested in Government Securities lodged in the Government Agency Office, ...	16,333	5	4			
Ditto lodged in the Bank of Bengal as Security for Loan, ...	4,000	0	0			
				20,333	5	4
Amount of Subscriptions in arrear, ...	7,582	11	9			
Amount of outstandings for seeds, grafts, copies of Journal, &c., ...	1,774	0	3			
				9,356	12	0

E. E.

S. H. Robinson,

Acting Secretary.

LIST OF MEMBERS

Agricultural & Horticultural Society

INDIA.

DECEMBER 31*st*, 1854.

ALPHABETICALLY ARRANGED

DISTINGUISHING THE YEAR OF ADMISSION.

OFFICE-BEARERS.

President:

SIR LAWRENCE PEEL.

Vice-Presidents:

W. HAWORTH, ESQ.
SIR ARTHUR BULLER.
BABOO GOBINDCHUNDER SEN.
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THE JOURNAL

OF THE

Agricultural & Horticultural Society

OF

INDIA.

NOTICES REGARDING THE INDIGENOUS COTTON AND SILK OF PEGU.

I.—*Memorandum on the indigenous Cotton of the Northern Districts of the Province of Pegu, (with specimens). By Major* A. P. PHAYRE, *Commissioner of Pegu.*

(Communicated by the Government of India.)

Most of the Cotton produced in the Province of Pegu, is grown on the hills which form the water-shed of the country lying between the rivers Irrawaddy and Sitang. A considerable quantity is also produced on the Eastern slopes of the Arrakan range. The elevation at which it is planted varies from four to eight hundred or one thousand feet above the sea.

The soil is prepared for it during the months of January and February, by the forest trees being cut down and left to dry in the sun until about the beginning of May, or just before the first showers of rain, when the fallen and dried timber is fired. The seed is then sown amongst the ashes, a hole to receive it being scraped in the soil with a small hand hoe or *dha.* Paddy and cotton are in some parts of the country generally sown together. The paddy ripens and is reaped during October or November. The cotton commences to be picked towards the end of February. The plant is an annual, and from the rude system of cultivation existing among the people, and the want of terraces, it is found necessary on the hill sides to make a fresh clearing of the forest for the crop of each year.

The tribes who follow this mode of cultivation are Karens, Khyens, and a few Burmese.

The cultivators sell the cotton uncleaned, that is with the seed still attached to it. They have a gin similar to the *Churka* used in India to clean what is required for their own use. They state that 100 viss (or 365 ℔s.) of uncleaned cotton, produce 30 to 35 viss, (109 ℔s. to 127 ℔s.) of cleaned.

The sample of uncleaned cotton herewith sent was purchased at a village situated in the Hills, on the Eastern border of the Prome district. It was grown at an elevation of about 600 feet above the sea, and is a fair sample of the quality of the cotton raised in Pegu.

The present price of this cotton is very high, being not less on the spot than 20 Rupees the 100 viss, nearly one anna a pound for uncleaned cotton. Three years ago the ordinary price was from six to seven Rupees the 100 viss. This great increase in price arises from the entire interruption to agriculture during the war, and the confusion and want of confidence among the people until about the sowing season of 1854.

Up to the year 1852 the cotton ground throughout the Prome and Meeaday districts was purchased by Chinese merchants, who established depôts for cleaning it on the banks of the Irrawaddy. They used to clean it with iron gins, and convey the cleaned cotton by water to Ava, and from thence, viâ Bhamoo, to the Province of Yunnân. As an instance of the price which the Chinese are prepared to pay for raw cotton, I may mention, that during the present year (March, 1855), the Chinese Merchants in Ava have paid 55 Tikals of silver (or say Rupees) per 100 viss for the *cleaned* cotton, and that the quantity exported was valued at eight lakhs of Rupees. It still has to be carried more than 200 miles from Ava by water to Bhamoo, and then to be put on the backs of mules for several days' journey by land, before reaching its destination. Taking the difference of weight between the Tikal and Rupee, the price of this cotton sold in Ava may be put down at two and a half annas a pound. There appears no reason why English twist should not find a ready sale in Ava for the Yunnân market.

The Cotton cultivating tribes in the Province of Pegu are now rapidly extending their cultivation, and in another year or two, I expect to see prices down to about eight Rupees the 100 viss (365 ℔s.) of uncleaned cotton.

PROME: *April* 4, 1855.

Report on the above-mentioned samples of Pegu Cotton: (Communicated by the Chamber of Commerce to the Government of India.)

I find this Cotton fibre *(Gossypium)* in all its characteristics, like many other specimens which have been sent to the Bengal Agricultural and Horticultural Society from parts of the East India Company's territories which lie far eastwardly of the River Ganges, being proximate to and even amidst the high and mountain ranges lying between the parallels of 20 and 27 N. Latitude.

It is very probable that the climates of these localities are very similar, and that in their present state and condition they are calculated to give a peculiar character to the fibre of the vegetable cotton *(Gossypium,)* in like manner as is exemplified in some productions of the animal world.

Thus I instance analogously the Rungpore and Thibetian horse as possessing very close assimilation, and observe that when compared with the horse of the plains lying far westwardly, viz. : of the Deccan, Scinde, Persia and Arabia, notwithstanding the variations found in the said animal of each of these last-named countries, though showing much general similitude, the main characteristics of the two races are so obviously marked, as to admit of no dispute about their distinctiveness ; the former exhibiting the primitive rudeness of nature ; the latter the graces and amenities consequent on improved breeding and better chosen localities.

I know not the character and status of the country about Prome, but presume it may partake more or less of jungly state, and be proximate to highly mountainous ranges.

Doubtless the climates and soils of all countries may undergo great changes by the arts of man, and be made suitable for yielding improved products of agricultural industry.

It is not my office however to hold a dissertation on such matters, but to report on that which is laid before me, and to accompany the same with any useful suggestions.

The cotton is excellent in some respects, but it is very different in its character and nature from that which is grown in most of the cotton-growing localities in India westward of the Ganges.

The fibre is coarse, curly, harsh, and rather short ; and it is very tenaciously attached to the seed ; but it is most exceedingly strong, and in this respect lies its excellence.

Its colour, condition and healthfulness are truly good ; and the seeds are very abundantly enveloped in wool.

Notwithstanding its great strength, there would be much difficulty and much breakage in detaching the fibre from the seed by any of the ordinary gins or extraordinary saw-gins, in use.

The common Indian hand *Churka* is probably the best machine adaptable for its most perfect divestment.

Its value in Liverpool in March month, 1855, may be taken at 3½*d.* to 4*d.* per ℔., and in May month, 1855, at 4½*d.* to 5*d.* per ℔., if pretty well detached from the seed, *i. e.*, without much breakage.

I would beg to suggest to the Pegu Commissioner the probable advantage which might arise from changing and improving the breed or variety, if I may so say.

This may be accomplished by growing intimately intermixed the best American varieties with the indigenous kinds.

The new varieties which may be expected to arise, if then resown, in conjunction with the best and purest American, would in all probability yield a very acceptable cotton; partaking of the strength of the indigenous parent, and of the length, fineness and flexibility of that of the American kind.

The acclimation being perhaps thus better maintained and illustrated, in a new variety, than by an attempt at once to substitute the American for the indigenous kind.

But each system might be tried simultaneously in different or even the same localities.

Thus the course of future culture would be best determined by the degree of success or otherwise found in each system.

I will only add that if the Commissioner shall deem my suggestion worthy of a fairly tried experiment, that I hope he will then cause the result in all particulars attending the trials in the cultivation to be laid before the Chamber of Commerce and the Agricultural and Horticultural Society of Bengal.

(Signed,) JOSEPH WILLIS.

Clean, and of good color, free from stains: the staple or fibre is *particularly short,* though strong.

The sample is not ginned, but has the seed in it, as taken from the pod. Taking *middling* Orleans cotton, in the Liverpool Market, at about the last price of *7d.* per ℔. I value the sample received, when in its ginned state, or free from seed, at *4½d.* per ℔. in Liverpool.

The unginned cotton may be expected to give two-thirds weight of seeds, and one third of cotton.

(Signed,) WM. BLUNDELL.

This is "Kupass," or cotton taken from the pod, without being separated from the seed, and in its present state is not in a merchantable condition, and consequently it is impossible to put a valuation upon it that would be likely to serve any practical purpose.

Separated from the seed I think it might be worth 2¾*d.* to 3*d.* per ℔. in England.

It is a green seeded cotton, of sound healthy appearance, but it is probably either originally of an inferior stock, or has degenerated through unskilful cultivation.

The staple is very short, the fibre of very considerable strength, but not fine, the seed is, for a cotton indigenous to India, particularly well covered, or clothed, with the cotton-wool, which however adheres to the seed husk with extreme tenacity.

It is particularly clean, and the color and condition generally (having regard to the fact of the sample being Kupass) are both very good.

I have had a small portion of the cotton separated from the seed by the Cottage Saw-Gin, which was presented by the Government to the Agricultural and Horticultural Society, and is now in their Rooms in the Metcalfe Hall, and I find that, after undergoing this process, the staple is much cut, or shortened, and a considerable quantity of the cotton lost by remaining attached to the seed. This result exhibits a peculiarity of this cotton which I consider to be its greatest defect, and one likely to interfere materially with the profitable cultivation of this cotton; but I am inclined to think, that were Seychelles or Pettigulph seed sown in the soil where this cotton has been grown, they would probably yield a more profitable crop, and certainly produce a description of cotton far superior to this.

(Signed,) **Stewart Douglas.**

II.—*Memorandum on Silk produced in the Northern portion of the Province of Pegu, (with specimen.) By Major* A. P. Phayre, *Commissioner of Pegu.*

(Communicated by the Government of India.)

The Silk thread herewith sent was produced, in the district of Prome. The worms are bred amidst the hills and high lands, by the same class of people who grow cotton. The worm is fed on mulberry leaves. The mulberry plants are allowed to grow three or four years, after which they are cut down, and a new plantation is made, fresh soil being cleared for the purpose.

During the present year silk thread of the quality of the sample sent sold for nine Rupees a viss (365℔s.) in the villages. Before the war, that is up to 1851, the ordinary price of silk was about seven Rupees a viss, and will probably soon be down to that rate.

The price at places on the banks of the river however is very high, at present the rate in the town of Prome is sixteen Rupees the viss (365℔s.) From the dress of the Burmese, both men and women, being chiefly of silk, the price of that article will generally be high throughout the whole country.

Prome: *The 4th April,* 1855.

Report on the above-mentioned sample of Silk: (Communicated by the Chamber of Commerce to the Government of India.)

Extract of letter from SECRETARY CHAMBER OF COMMERCE, *dated August* 7, 1853.

3. The specimen of Silk is in every respect similar to that which the Government forwarded to the Chamber in December last, and as Mr. Kilburn's report upon that sample applies exactly to the one now before the Chamber, the Committee conceived that a copy of that report is all that would be required by Government.

Sample of Raw Silk.

This has been prepared to meet the wants for local manufacture, or the manufactures of India. It is of very little value for any European market, and would be very difficult of sale. The London value at this moment is from 5*s*. to 6*s*. per ℔.

CALCUTTA : (Signed,) EDWARD D. KILBURN.
30*th December*, 1854.

Notes regarding the cultivation, drying, and curing of Tobacco. By Lieut. F. W. RIPLEY, *Principal Assist. Commissioner of Arracan. (With a plate.)*

Soil.

1. A light clay soil is best, situated if possible on the low bank of a river, which is overflowed during the rainy season. In Java however sometimes fine Tobacco, I am informed, grows on sandy banks near the river side.

2. The soil should not be too rich, as although the plant grows to a large size, the tobacco is not good, and the dried leaf will not burn properly.

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Nurseries or seed beds.

3. The seed is sown at the close of the rains in nurseries or seed beds, from 14 to 16 feet long, and 4 to 5 feet broad and 6 inches high (formed like asparagus beds in England,) care however should be taken that the same be well drained. The richer the compost used for these beds the better, it must be well sifted. Before sowing the seed a quantity of dry straw is generally burnt on the surface of the bed, to kill ants and other insects.

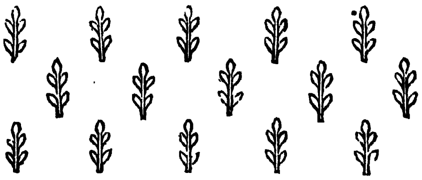
4. The seed should be well mixed with wood ashes; for a bed 16 × 5, two thimbles full of seed is sufficient, and it will yield from 7 to 8,000 good plants. The seed must be well scattered. It is best after scattering the seed to cover it with a thin layer of fine sifted earth and well water the bed.

5. In Java the nurseries are protected with a light roof of leaf thatch about 6 inches from the ground, which however on the young plant appearing above ground is raised to the height of 5 or 6 feet; great care must be taken to protect the young plant from the sun's rays for the first fourteen days, after which the roof is dispensed with.

6. In six weeks the plant is about 6 inches high and fit for transplanting.

Fields.

7. The fields should be carefully ploughed five or six times, so as to clean the ground entirely from weeds. In Sandoway the fields are levelled, but in Java they are furrowed, the tobacco being planted in ridges 3 feet apart, not opposite, but thus:



Transplanting.

8. The young plants on being transplanted are sheltered from the sun, with a piece of plantain bark or large leaf, until it has taken root, and if no rain falls they must be watered about the root; all plants that die should be renewed immediately.

9. In a month or six weeks the plants will show signs of blossoming, and must immediately be topped, leaving only fourteen leaves. After this the plant will throw out young shoots or branches, called by the tobacco planter "Thieves," which should at once be cut off, or the leaves will not attain full size.

10. The field should be kept clean from weeds and the plants inspected daily, to destroy any grubs or caterpillars that may attack them.

Harvest.

11. The four lower leaves will become yellow long before the rest of the plant, and must be picked off and dried. Tobacco is generally ripe in three months from the date of transplanting, when fit, the leaves become spotted yellow, if picked before ripe, it will not dry of a good color.

Drying.

12. The plant is cut off close to the ground, and with a loop of bast tied to the stem slung on a bamboo for hanging it in the drying sheds. On a bamboo about 6 feet long fifteen green plants can be hung thus:—

The bamboos should not be too close, at least one foot space should be left the first eight days, when the plants become dryer they may be put as close as 6 inches. See Plan C.

13. Tobacco takes from four to six weeks to dry. The best sign to know when it is dry, is when the main stalk which runs through the leaf will break on being bent, but it is advisable to leave the plants for at least eight days longer; as unless the tobacco is thoroughly dried it will not

dried

Sorting.

14. The leaves are now to be broke off close to the stem, and placed in heaps according to size. These heaps are then again divided in smaller heaps according to color. The leaves are tied in bundles of twenty-five or thirty leaves with bast by the stems. The bundling should be done before nine o'clock, while the tobacco is from the night air moist. The sorting can take place during the other part of the day when it is dry.

Fermentation.

15. The fermentation is the next process. The tobacco is placed on raised benches about 2½ feet from the ground in heaps about 3 feet broad and 6 feet long, containing not less than four maunds, each description being kept separate. The stalks of the leaves should form the outside of the heaps; as soon as the tobacco begins to ferment and the inside becomes warm, the heaps are opened, and the tobacco packed in heaps five or six times the size, the inferior tobacco being placed below, the best in the middle, and the inferior on top and round the sides. Bamboos should be placed every two feet in the large heaps to enable the curer to ascertain the heat and state of the tobacco.

16. It is impossible to specify any regular time for the fermentation, it depends much on the state of the weather. The larger heaps should when the upper layers of tobacco are moist from the sweating of the leaves be broke up and remade, the upper layers being put below, the lower at top, &c., &c.; this process must be repeated until the fermentation and great heat subside; here in Sandoway it takes about six weeks, the heaps being remade every five or six days.

Packing.

17. Tobacco is packed in bales of about one and a half maunds, measuring 3 feet × 2½ feet and 1¼ feet thick,—being pressed.

Drying Sheds.

18. The best drying sheds are 500 feet long by 30 feet broad and 30 feet high in the centre, as per plan A. The sides being composed of close

bamboo mat walls 20 feet high with openings at regular intervals, to allow of a free circulation of air during the day, but they must be shut close at night, and in damp weather, and in high winds, the doors to windward should be closed.

19. Stanchions are placed from floor to roof 6 feet apart in four rows the whole length of the godown,* strong whole bamboos being fastened from the stanchions to the side walls,† 4 feet, one above the other, as in plan B, to hold the 6 feet bamboo rods on which the tobacco is hung to dry.

Note.—Care should be taken to select the finest and strongest plants for seed prior to topping the rest.

SANDOWAY: *August* 25, 1855.

Remarks on certain species of Silk-worms indigenous to India. By Capt. THOMAS HUTTON, F. G. S.

To the SECRETARY *of the*
Horticultural Society of India, Calcutta.

MY DEAR SIR,—Until you had the kindness to send me Part III. Vol. VI. of your Journal for 1848, I was quite ignorant of any correspondence on the subject of the distribution of silk worms having taken place between Messrs. Hodgson and Frith. Having, however, now become aware of the fact, and perceiving that while the latter gentleman appeals to my published statements in corroboration of his own views, the former is inclined to doubt my authority, I shall briefly state a few circumstances which will perhaps show the above disputants that like the worthies in the fable of the Chameleon, it is quite possible that there may be truth on both sides, though neither party has exactly hit the nail upon the head.

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* Plan B.

† Plan B.

The first notice is that of the Tusseh Moth *(Saturnia paphia)* which Mr. Frith says, he has procured from Mussooree, and Kussowlee, a statement doubted by Mr. Hodgson, who confines the insect to the plains and base of the hills, pointing out that Collectors are in the habit of jumbling species from various localities in the same box, and calling them a collection of Himalayan species.

Mr. Frith afterwards appeals to my letter to Mr. Westwood as showing, as he imagines, from the mention of *Saturnia paphia,* that I had procured it at Mussooree. This is rather a bold jump to a conclusion!

In reply to this part of the discussion, I incline to the side of Mr. Hodgson, whose remarks regarding the mode adopted by Collectors of specimens in general, no matter, whether of birds or insects, are most correct. The practice here at Mussooree is this:—a person wishing to make a collection either takes a native Collector into service or purchases the specimens singly from independent Collectors who hawk about insects for sale. These native gentry, whether hired or otherwise, not being over fond of hard work, invariably *go down from Mussooree into the Doon at the foot of the mountains,* and having there filled their boxes, return to the hills to sell them.

The Collector, in most cases disdaining to know the difference between a moth and a butterfly, stows them all away into his boxes, some having heads, some having none, no matter an insect is an insect even when its head's off! These collections of rubbish are then sent off, or carried off, as illustrative of the entomology of Mussooree and Landour, to which the collection bears about as close an affinity as the fauna of Southern India does to that of the Northern Provinces, species common to both being intermingled with others that exclusively belong to the one locality or the other. Thus the greater portion of species in these collections is exclusively lowland.

Now among the lowlanders I am inclined to include the Tusseh Moth! I have collected at Simla and its neighbourhood, as well as at Mussooree, but during my long residence at the latter station, I have only *once* in fifteen years seen the Tusseh Moth, and that one specimen was a female captured *in the Dehra Doon, near Hurdwar;* besides that, I am not altogether certain that the species is identical with the true Bengal Tusseh. In fact I doubt the occurrence of that species in the Hills, whether at Mussooree or at Kussowlee.

Thus far the statements of Mr. Hodgson, are, I think, correct, but when he proceeds to assert that the *saul tree, (Shorea robusta)* does not extend westward of Hurdwar, he falls into an error that any traveller may correct, since there are splendid forests of saul throughout the Dehra Doon, and even away as far west as the Jumna, if not farther.

The Tusseh Moths to which I alluded in my letter to Mr. Westwood, were all sent to me in coccoon from Bhagulpore, by the late Captain Don. We have here at Mussooree, and also at Simla, a species of Saturnia feeding on the common Hill Oak *(Q. incana)*, and bearing a resemblance to the Tusseh Moth, though much smaller, and quite distinct; can this be Mr. Frith's Kussowlee species?

Mr. Frith notices the moistening of the threads when the Tusseh is about to emerge from the coccoon, and says that as the insect has *no mouth*, he concludes that it turns round in the coccoon, and discharges the liquid from the body.

I doubt this, because I have fully ascertained that the species known as *Actias Selene* (*not Arctias* as stated in your Journal,) which is furnished on the shoulder of each wing with a hard brown spine for the purpose of dividing the threads, likewise discharges a moistening liquid, and although, as in *Saturnia,* it is said to have *no mouth* yet it is nevertheless *from the mouth,* or the place where it should be, that the solvent is discharged. The mouth is an *imperfect* mouth only, and is not organised for the reception of nourishment, although sufficiently perfect, it would appear, to secrete the liquid, with which the threads are moistened. When the agglutinising matter is thus dissolved the threads are easily separated by the wing spines, and an opening afforded for the egress of the moth. I have this season watched this process in no fewer than 200 specimens of *Actias Selene,* and can answer for there being no mistake in the matter, a drop of the clear colourless liquid often remaining upon the tuft of hair or down on the forehead between the eyes, and which tuft appears to be used as a brush for the application of the solvent to the threads of the coccoon.

Mr. Frith mentions having "inspected a very fine collection, made by a gentleman at Mussooree, in which are no less than eleven species of true *Bombycidæ,* viz.:—nine of the genus *Saturnia ;* one of *Actias (not Arctias)* and one of *Phalæna (Saturnia) Mylitta,* or the true Tusseh Moth."

Now if this collection belonged to a son of the late Col. Buckley, I can easily clear up the mystery of the Tusseh Moth coming from Mussooree, since it was *one of my Bhagulp[illegible]e specimens* given in exchange for something else: And I may as well point out that the collection to which I allude contained species from various parts of India, I myself having contributed insects from Mirzapore, Neemuch, and even from Afghanistan in exchanges, while there were also a few from China! Besides which, Mr Buckley's object being to make a collection, without noting or caring for locality, the greater number of his specimens came as usual from the Dehra Doon.

This, (if I am right in my conjecture about the collection alluded to by Mr. Frith,) may serve to show with what degree of suspicion any collection, *not made by a naturalist,* should be regarded by scientific men both at home and abroad, since by taking it for granted that the collection contained only the species proper to the locality in which it is stated to have been made, the closet naturalist may be led to form the most erroneous conclusion in regard to the distribution of species. Nor is this remark to be confined to insects only, since it will equally apply to Ornithological collections; so that any modern Adam, who may undertake to form a system, founded rather *upon the length and breadth of an animal's tail,* than upon the habits and manners of the species in their native haunts, and who thunders forth his dogmas from his artificial paradise of musty skins, may, and doubtless often has, put forth a host of errors for the acceptance of other *naturals* as little conversant with living species as himself!

My own limited experience, therefore, leads me to coincide in opinion with Mr. Hodgson, and I accordingly reject the Tusseh Moth from the catalogue of Mussooree and mountain species, not even granting it a place at Kussowlee.

Of true mountaineers, we have, as far as my knowledge extends, three species of *Saturnia;* two others are found only in the depths of the warmest valleys, such as *S. Atlas?* and *S. Katinka;* the former occurring likewise in the Doon along with the Tusseh Moth; thus making in all six species of *Saturnia.* To these we may add one species of *Actias,* which is, I believe, confined to the Hills from 5,000 feet upwards to 7,000 feet, and perhaps higher; it occurs likewise apparently in Sylhet, as Major Jenkins long ago kindly sent me a drawing of what I take to be this species. And lastly we have one species of true *Bombyx (B. Huttoni* West:*)* which occurs abundantly on the wild mulberry from the Doon upwards to at least 7,000 feet. Thus showing a list of known silk spinners to the number of eight, viz. six *Saturnia;* one *Actias,* and one *Bombyx:* more there doubtless may be, although as yet unknown to me,* but I strongly suspect that some of those mentioned by Mr. Frith, as coming from Mussooree and Kussowlee, were, in reality natives of other localities. Mr. Hodgson likewise notices the occurrence of what he and Mr. Frith pronounce to be the Arrindy moth, *Saturnia Cynthia,* and I have it also from Mussooree, where the caterpillar feeds on a shrub called *Mussooree, (Coriaria Nipalensis,)* and from which this station derives its name. Dr. Roxburgh's figure of the caterpillar of *S. Cynthia,* is however so thoroughly unlike the caterpillars occurring here, that notwithstanding the *identity* (if I may so speak) of the imago, I am unwilling to pronounce decisively as to the species until I have an opportunity of comparing our larvæ with those of undoubted *S. Cynthia* from Bengal, and hence the reason I applied to you for eggs. Ours occurs from the foot of the hills up to 6,000 feet of elevation.

Having now said all that appears to bear upon the above mentioned correspondence, I shall, before concluding, observe that I have this year reared a number of the caterpillars of *Actias Selene* for the purpose of ascertaining the value of the silk, but am sorry to say, have failed in my attempts to unwind the silk from the cocoons. With some difficulty, I managed to procure a supply of eggs from the moths, which came forth in October, and had intended sending them to

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* *Note.*—Extract from a subsequent letter, to A. Grote, Esq., dated 6th December, 1855 :

"In my enumeration of the species found here, I omitted one large *Saturnia,* which I once found upon a quince tree, in the Botanical Garden ; the larva when first seen appeared to be a white cocoon on the back of a leaf, but a closer view showed me the caterpillar densely covered with long white hairs. I never procured a second specimen, but the collection taken down from this by young Mr. Buckley contained one, though not in very good condition. I think this gives us nine instead of eight species as I mentioned in my paper."

Europe, when to my regret and surprise they began to hatch on the 4th of November, and are still coming forth daily (10th). They are at present thriving on a shrub of *Coriaria Nipalensis* growing in the open air, but whether they will be able to spin up again before the frosts set in remains yet to be seen.

These caterpillars feed naturally upon *Coriaria Nipalensis, Andromeda ovalifolia,* the *walnut,* and I think also upon *Carpinus bimana.* The first named shrub would probably grow well and rapidly in some parts of Europe, and so furnish nourishment both for the larvæ of *Actias Selene,* if found worth introducing, and also of *S. Cynthia,* which seems to be acclimated in Italy.

I shall send you down a few cocoons that you may try your luck in unwinding the silk.

MUSSOOREE: Yours faithfully,
November, 1855. THOMAS HUTTON, F. G. S.

Abstract of Returns to Circular No. 1, *of the* 19*th January,* 1855, *of the Board of Revenue, Lower Provinces, on the subject of reaping, threshing, or winnowing Grain, by means of machinery.*

(Communicated by the Board.)

Burdwan, No. 459, dated March 19, 1855.	No experiments ever made in this Division.
Cuttack, No. 575, dated, 22nd March, 1855.	No experiments ever made in this Division.
Chota Nagpore, No. 9, dated 30th March., 1855.	No experiments ever made in this Division.
Arracan, No. 75, dated 13th March, 1855.	An attempt was made some years ago in the district of Akyab to husk paddy by machinery, but it proved a failure.

Nuddea, No. 358, dated 21st March, and No. 409, dated 16th April, 1855.

In Jessore and Moorshedabad winnowing machines are said to have been used, Mr. Tripp, manager of Mr. Kenny's Factories in Jessore, states that the trial was made "with great success in clearing oil seed," and that two labourers were thereby enabled to perform the work of ten. The experiment at Moorshedabad tried by Mr. Logan, some fifteen years ago, did not succeed.

Patna, No. 1414, dated 15th March, 1855.

The Assistant in charge of the Meerpore Factory Chumparun, has just completed a threshing machine on the common English principle. It is worked by hand, and has hitherto been employed in threshing mustard.

A rude drill plough is extensively used by the *ryots*, for sowing their *rubbee* crops. It consists of a bamboo tube added to the common plough, and both sowing and ploughing are conducted by one person.

Dacca, 12th March, 1855, No. 437.

Experiments tried only in the district of Mymensing.

A winnowing machine is stated to have been successfully used by Mr. Baldwin, of the Soobuncolly Indigo concern, who represents that several thousand maunds of linseed, oats, and peas have been cleared with it, and that it has been a considerable saving of time and labour.

Bhoyrub Chunder Chowdry, one of the zemindars of Mymensing, has just got up a mill or machine to separate the husk from paddy, which cleans about eight or ten maunds of rice daily without breaking the grain.

Bhaugulpore, No. 608, dated 21st April, 1855.

The Collector of Purnea, states that in a few instances experiments have been made in his district for winnowing grain by means of machinery, and that those experiments have been attended with satisfactory results. Mr. J. J. Shillingford, Indigo planter, by whom the winnowing machine was tried, reports that about 200 maunds of grain can be cleared with it daily.

No machines for reaping or threshing grains ever tried in this Division.

Rajshaye, Nos. 5 and 8, dated 18th May, 1855.

In the district of Rajshaye, Messrs. Watson and Co., many years ago tried a winnowing machine of the kind then in use in England, but with what success does not appear. From the circumstance of its discontinuance, it is supposed to have proved a failure.

In Pubna, Mr. Kenny, of Salgurmoodia, had one time two winnowing machines, and it was found, the Collector is told, that two men could clean a given quantity of seeds with the help of one of the machines in the same time that ten men could clean an equal quantity without such assistance. Mr. Kenny having lately proceeded to England, he is unable to obtain further particulars of the results of his experiments.

Chittagong, No. 1506, dated 17th March, 1855.

Machinery never tried in this Division in reaping, threshing, or winnowing grain, but there is a mill for husking paddy used by the Mugs in the Southern part of the district, which the Commissioner considers worthy of notice. The Chittagong Collector states that seven men, with the aid of this machine, can husk and clean as much rice as sixteen men working in the ordinary manner.

Assam Nos. 302, 308 & 319, dated 2nd, 8th & 29th March, respectively.

Experiments never tried in this Division.

Report by Lieutenant-Colonel S. F. Hannay on his experimental Cotton farm at the Mathola, in the District of Luckimpore, Upper Assam.

(Communicated by the Government of Bengal.)

To the COLLECTOR OF LUCKIMPORE.

SIR,—I have the honor to acquaint you that the small packet of cotton I sent to you a few days ago, is the produce of my experimental garden at the Mathola, from acclimated seed of the Sea Island or black seeded, greenish seeded or Barbadoes, and the Pettigulph, a sample of each being enclosed in the parcel. The seed of these cottons was originally sent to me through Colonel Jenkins by the Agri. & Horticultural Society of Calcutta.

2. As the quantity of produce is however so small compared with the extent of ground sown, it will be necessary for me to offer some explanation on this point, as well as to notice the progress of the seeds received from the Society last year.

3. I am aware that the proper season for the native kinds of cotton in Assam, is the commencement of the rains and spring, the latter season being adapted for what is planted on the Asoo Rice Crop, and the produce is harvested in October and November; but the foreign kinds of cotton, in Upper Assam, give a succession of flowers and fruit for two or three years, the trees throwing out abundance of flowers and cotton boles, particularly towards the month of July, when heavy rain generally destroys all prospect of a good harvest.

4. Last year, I commenced sowing acclimated seed and a small quantity of Seychelles cotton seed I received from the Society early in April, and continued doing so at intervals until the middle of June. In the month of August nothing could have been finer and more promising than the cotton trees, the ground planted being about 2½ acres. In the month of September, some of the Sea Island trees stood eight and nine feet high, bearing from 80 to 100 boles of cotton. The rainy season, was mild and favourable to the growth of the plant, but I regret to say that cold raw rainy weather commenced early in October, and completely destroyed all my hopes of a good harvest. The Seychelles cotton plants did not come to seed, and not knowing the nature of this plant I cannot account for this.

5. It now remains for me to state that I duly received the maund of Sea Island and Pettigulph seed sent me by Government through the Society; the season was past. I thought it best to plant out as the seed did not look very fresh; I regret to say the Pettigulph totally failed, and a great portion of the Sea Island had so little vegetating powers that numbers of the young plant died in the cold season: I have now however about one acre of this plant, and the whole of the last season's plants in excellent condition, and it remains to be seen what crop I shall have. I am also planting out about ten seers of last year's acclimated seed, and I am in hopes that the produce of this may come to maturity at a fitting season.

I have, &c.,
(Signed,) S. F. HANNAY,
Lieut.-Col. Comm. at Debrooghur.

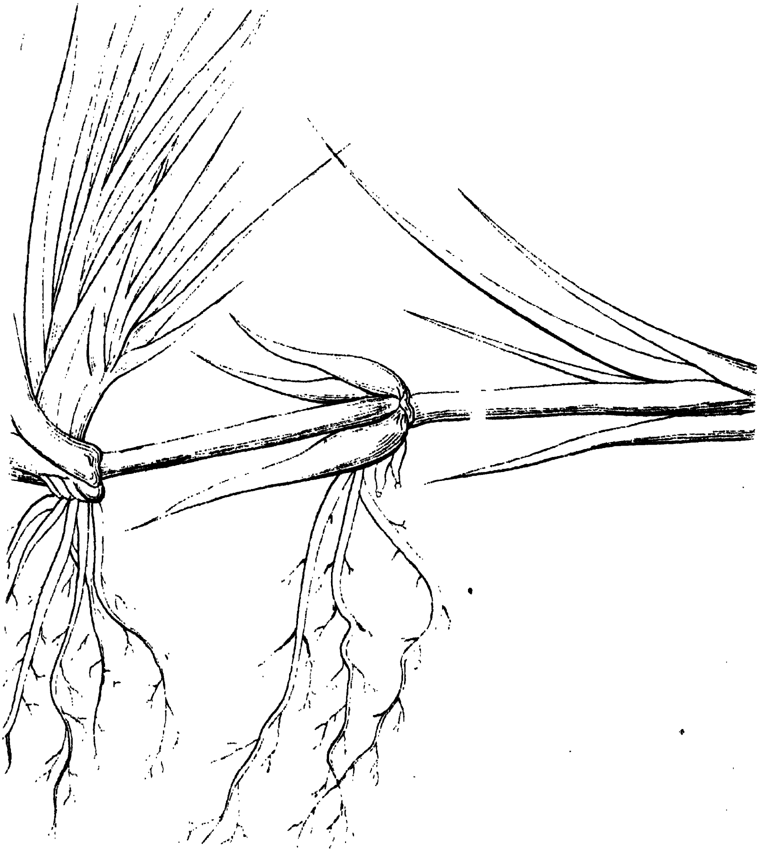
DEBROOGHUR:
6th June, 1855.

Note on the sand-binding plants of the Madras Beach.

By HUGH CLEGHORN, M. D.

Having lately been requested by the Military Board to examine the condition of the South Beach, between the Saluting Battery and Saint Thomè, with a view to consolidate the drifting sand thrown up near Colonel Cotton's groins, I endeavoured to estimate the comparative value of the different species of maritime plants in preventing the encroachments of the sea on the land, and in fixing the loose soil along the shore. All that seems worthy of mention has been condensed in the following short notice of these useful plants,

The wide-spreading roots and under-ground stems of the sand-binding plants extend themselves in quest of food, and thus become interwoven together, so as to sustain the soil in a sort of basket-work, and consolidate the sands thrown up by the waves of the ocean. If it were not for the



subterranean stems of these seaside plants, which can vegetate amidst dry and drifting sand, the banks which man heaps up as a barrier against the sea would be blown away by the first hurricane. In Holland, the great sea-dyke preventing inundation, owes its stability to these plants, which are carefully protected under the instruction of Government. Along the shore of Great Britain, as in Lincoln, Suffolk, &c., the quantity of dry land has been increased by the propagation of the Bent star or Sand Carex *(Carex arenaria)* and Lyme grass *(Elynius arenarius.)*

Of the plants growing on the Madras beach, the species known to Europeans by the designation of "Ground Rattan" *(Spinifex sqarrosus)* comes nearest to the *Sand Carex* of England in its habit of growth, creeping along horizontally sometimes above, sometimes below the surface of the earth, emitting roots and shoots at short intervals of a few inches. It likewise possesses the advantage of being extremely tenacious of life; the shoot at every node is capable of renewing the existence of the individual as fast as destroyed, and the whole plant offers a resistance to the storm which is rarely overcome. I think this species would be nearly as indestructable from natural causes as Conch grass, and it appears to me (after watching patches of it on the road to Ennore, where it is little disturbed) that it would speedily colonize the sand tracts spontaneously, if it were only left unmolested for a year or two. The fishermen do not appreciate the conservative design of this ground rattan or mat grass, but collect it for fuel, and thus destroy their greatest protection: the reason seems to be that the spiny leaves injure their naked feet, and the turf does not answer for spreading their nets upon. On this account it would be well to propagate the other species mentioned, immediately in front of fishing villages. This grass is *Polygamo-diœcious,* and reproduction is effected in a very remarkable manner; the male spikes congested into an umbel are carried by the wind to the female flowers, which are fascicled on a distinct plant, and being light and spherical, the Dutch call them wind-ball (Wind-boll).

Rumphius in the "Herb. Amboinense" alludes to this plant, as being connected with a superstition among the natives, who, seeing the capitula carried along the shore by the sea-breeze, think they are propelled by the devil.

Ipomœa pescapræ of Sweet. Goat's foot leaved *Ipomœa*, (also known as Rabbit weed). Perennial, creeping to a great extent. Stems rooting at distant intervals. Leaves smooth, long petioled, two lobed, like those of *Bauhinia.* Flowers large, reddish purple, very handsome. Common on the sandy beach north and south of Madras, where it is of great use in binding the loose sands. This fine creeper is equally abundant on both peninsulas, and is also a native of Mauritius, Macao, &c., occupying the place of *C. Soldanella* of the Scottish coast. Rabbits, goats, and horses eat it, so do cows, but their milk is tainted.

Hydrophylax maritima, Linn. Seaside *Hydrophylax.* A straggling herbaceous plant, native of the shore of Coromandel, where it shows its pale pink blossoms great part of the year. The branches run over the sand (sometimes under the surface) and strike root at the joints. Figured in Roxb. Cor. t. 233.

Microrhynchus sarmentosus, Wight. A widely diffused humble plant, common along the sea beach, with long flagelliform runners. It is well figured in Wight's illustrations, Vol. II., t. 133.

Pupalia orbiculata, Wight. Stem prostrate, leaves orbicular. An extensively spreading procumbent plant, of which the runners occasionally measure three or four feet. It is abundant at Saint Thomé, and the mouth of the Adyar river. Figured in Wight's Icones.

Pandanus odoratissimus, Linn. (Kaldera bush.) A large spreading ramous shrub, which fringes the coast in many places, and is often planted in belts, but takes up much room, forms dense thickets, and harbours venomous reptiles. This is a very strong binder, but is objectionable from its raising sand hills, which interrupt the currents of sea breeze to the island.

Ehretia arenaria, Griffith, which is found between 12° and 28° N. L. (*Vide* "Notulæ ad plantas Asiaticas," Part IV, page 212,) appears to be widely distributed along the sea-coast, and binds together the loose sand, although in a minor degree.

The above are the sand-binding plants most frequently noticed along the Coromandel beach. There are others as *Pedalium murex* and *Sesamum prostratum*, &c., which co-operate in the work of conservation to a minor extent, but are less widely diffused along the coast. In this notice I have only included those which seem obviously preferable for the purpose specified.

List of sand-binding plants.

Spinifex squarrosus, ..	.. Ground rattan.
Ipomœa pes capræ, ...	.. Goat's foot *Ipomœa*.
Hydrophylax maritima, ..	.. Seaside *Hydrophylax*.
Microrhynchus sarmentosus.	
Pupalia orbiculata, ..	... Round leaved *Pupalia*.
Pandanus odoratissimus, ..	.. Kaldera bush.
Ehretia arenaria, ...	.. Seaside *Ehretia*.

Report on various specimens of fibres from Bijnore, Upper Assam, and other localities.

To the MEMBERS OF THE HEMP AND FLAX COMMITTEE.

GENTLEMEN,—By desire of the Society I have the pleasure to circulate, for the favor of your opinion on them, certain specimens of fibres, as detailed on the other side; together with the three communications from Mr. Wingfield, Col.

Hannay, and Baboo Parbutty Churn Banerjee, relating to them. Any information that the Committee may be pleased to afford, in reference to the fourth para. of the Baboo's communication, will be thankfully received by him.

I am, &c.,
METCALFE HALL, CALCUTTA : A. H. BLECHYNDEN,
28*th July*, 1855. *Secretary A. and H. S.*

List of specimens of fibres.

From C. J. Wingfield, Esq., Magistrate and Collector of Bijnore, (as per his letter of 12th June, 1855.)

No. 1.—" Sunn" fibre *(Crotalaria juncea.)*
No. 2.—" Sunnee" fibre *(Hibiscus cannabinus.)*
No. 3.—Ditto less cleaned than No. 2.
No. 4.—Flax *(Linum usitatissimum.)*
" Ulsee."
No. 5.—Cloth made from " Sunnee."

From Board of Revenue, L. P., Col. Hannay's specimens. (Letter from Secretary, Board of Revenue, of 13th July, 1855.)

A. "Egarwah" fibre, native marsh mallow.
B. " Gorakhi khora" fibre.
C. " Pichola" fibre.
D. " Mechaki" fibre.

N. B.—Sample *B.* is the "Woolut coomul" of the natives, *Abroma Augusta : C.* is the produce of a species of *Sterculia,* and has a bast-like appearance. Some of the basts of Burmah and Arracan are produced by *Sterculias. D.* the produce of a species of nettle, has been already before the Society,—sent by Col. Hannay,—and reported on by a late Member of the Committee, Capt. Thompson, (see Vol. VIII, p. 90, copy circulated herewith, and also the log-line alluded to.) The "Rheea" specimen is not included in the above, it having been frequently before the Society; moreover, the Board of Revenue have requested Messrs. Harton and Co. to submit to the Society specimens of rope and line made from it, and which will, no doubt, be accompanied by a report on its strength, &c.

From Baboo Parbutty Churn Banerjee, (memorandum without date, received in July.)

Three samples of various qualities of Sylhet jute.

Four samples of Jute (Surajgunje, Bauleah, Roygunje, and Dessee,) for comparison with the Sylhet specimens.

Dear Sir,—I have sent you by bhangy some specimens of the native hemp made from the Sunn and Sunny plant. The former is, I believe, called "*Crotolaria juncea*" by naturalists, the technical name of the latter I do not know. They are quite distinct plants, differing in flower and shape of leaves. The flower of the sunn is like that of the cotton plant; that of the sunny like the *urhur*, a tree that produces the *dol* grain. Dr. Jameson thought the sunny hemp the best for rough purposes, the fibre is of such length. I have enclosed a specimen of the *Tat*, a coarse cloth for sacking, &c., made from it. Both, particularly sunny, grow in extreme luxuriance in this district near the range of hills, and the hemp in November sells at from 25 to 35 seers the Rupee. I could get any quantity. I admit that these specimens have been badly prepared. They have been allowed to lie too long in water, and have become brittle in consequence, this I would avoid in next year samples. I cannot but think that very excellent cordage might be manufactured from the sunny hemp if properly prepared, and the supply might be inexhaustible.

I also send a specimen of flax prepared by me from this year's straw. I fancy it is very poor, and too short in the staple, but I cannot find that any flax in this district grows to above 18 inches in height. Mr. Gubbins must have selected remarkable specimens.

I do not think it would pay to have the flax prepared from the straw cut here, the people do not understand it, and it took a day to prepare about a pound.

As I told you in my last letter. It was too late to get any quantity of the straw this year; it had nearly all been threshed out by cattle.

I shall be glad to be favored with your opinion on these samples, and to receive any suggestion you can give me on the preparation of hemp.

1. Hemp from the "Sunn" plant.
2. Hemp from the Sunnee plant (has been too much washed.)
3. Hemp from the Sunnee plant.
4. Flax from straw of *Ulsee.*

Yours faithfully,

BIJNOUR, NEAR MEERUT, CHARLES WINGFIELD.
12*th June*, 1855.

To the Secretary to the Agricultural Society of Calcutta.

Land Revenue.
J. DUNBAR, ESQ.

SIR,—I am directed by the Board of Revenue to forward herewith for being deposited in the Society's Museum one box of cotton samples, with three bales and three bundles of Rhea fibre, (the latter particularized in the margin) grown by Colonel Hannay in his experimental garden at Debroghur in Upper Assam.

No. 14, 1 Bale, Bæhmeria nivea
,, 4 & 5, 2 Ditto Ezareeah, native Marsh mallow.
1 Bundle (from No. 11) containing twelve seers of Gorakhi Khora, Malvæ.
1 Ditto (from No. 12) containing seven seers of Pichola.
1 Ditto (from No. 13,) containing five seers of Mechaki, (*Urtica speciosa*)

2. One bale of the fibre has also been placed at the disposal of Messrs. Harton and Co., ropemakers, who have been requested

to supply the Board with some specimens of rope and line, wrought from the above, for transmission to the Society's office.*

3. I am directed further to annex, for the information of the Society, an extract (para. 3.) from Government letter No. 856, under date the 2nd instant, in which it will be observed that His Honor the Lieut.-Governor has been pleased to record the high sense he entertains of the zealous exertions made by Colonel Hannay and Captain Dalton to open and improve the natural resources of the country of Assam.

I have, &c.,
A. GROTE,
Secretary.

DATED FORT WILLIAM:
The 13th July, 1855.

Extract from a letter from the Under-Secretary to the Government of Bengal to the Secretary to the Board of Revenue L. P., dated the 2nd July, No. 856.

Para. 3.—In regard to the samples of cotton and minerals alluded to in the concluding *para.* of your letter, as having been received from Capt. Dalton and Colonel Hannay, I am to inform you that the Board's proposal to consign them to the Agricultural and Horticultural Society and the Asiatic Society respectively, is approved by the Lieut.-Governor. I am directed to add that the continued zeal and endeavours of the above-mentioned Officers to promote the natural resources of the country of Assam, are regarded by the Lieut.-Governor with very great approbation.

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* *Extract of a letter from Messrs. W. H. Harton and Co. to the Secretary of the Board of Revenue* :—

"We have the pleasure of forwarding a sample of Rheea fibre rope, manufactured for artillery traces; this was tested in the Arsenal, Fort William, and broke with a strain of 59 cwt., the last 9 cwt. were thrown upon the testing scale. We have forwarded a portion of it, with a certificate of weight that it broke at, to Lieut.-Colonel Abbott, who has sent it to the Select Committee at Agra, who we have no doubt in a few months will be able to test its wearing qualities."

BOARD OF REVENUE, L. P. *True Extract.*
FORT WILLIAM, A. GROTE,
The 13*th July*, 1854. *Secretary.*

A specimen sample from the three qualities in a duly sorted shipment of Sylhet jute sent to the London market. Also samples obtained in Calcutta of Bholeo, Dessee, Roygunje, and Surajgunje jute, for the purposes of comparison, and for the Society's Museum, from Parbutty Churn Banerjee of Ooterpara.

The specimens of Sylhet jute are the very fairest samples that could be obtained from 100 maunds, after sorting into the most even qualities. The batch was purchased at Sylhet for transmission to Calcutta, and took four months from day of purchase before it was shipped.

Twelve maunds out of it was entirely rejected on sorting, and sold for twelve rupees, and five maunds went in cuttings, and sold for one Rupee, giving an out-turn of twenty-two bales, each weighing three maunds twenty-two seers.

The presenter of the specimens says he understands Bholeo jute is always considered a very inferior jute at its best, that Dessee jute is a fine soft silky description, likely to supersede the best jutes from the improvements that are taking place in it, and its more extensive applicability, and that Roygunje and Surajgunje are long and harsh and strong fibres, the Roygunje not being so strong as the Surajgunje. He believes the whole four are the jutes most commonly met with in Calcutta, that the Surajgunje is considered a 2nd quality sample, and he is informed that the reddish color of the Sylhet arises from the plant having been allowed to remain too long after cutting before steeping.

He would be glad to be informed on this point, and for the fullest, and for any report on the three samples, a report that would point out all faults and blemishes, and how to avoid them. He offers to present specimens of all such other fibres and vegetable products produced in Sylhet as the Society may wish, and in such quantities as will suffice for experiment as well as specimen, and to spare; and to accompany whatever he may send with dried botanical specimens of the plant yielding the fibre, and the soil producing it, also mentioning the localities producing it.

Report on specimens of fibres referred to in the Secretary's Circular of 28*th July*, 1855.

From C. J. Wingfield, Esq., *Bijnore.* No. 1, Sunn fibre.—Resembling in appearance what is known under the name of Dessee jute. It appears to have been carefully prepared, the fibre being clean, strong and uninjured. Its great fault is inequality in length, varying from 30 inches to 6 feet. As jute, the very short lengths would be unsaleable, the medium lengths, say 4½ feet, would only rank as No. 4, and a smaller portion as No. 2. Excluding the shortest portion, the average of what remains may be classed as No. 3 jute, of good clean strong fibre.

Nos. 2 and 3. Sunnee fibre.—This fibre is of fair length and strength; but even the best prepared, No. 2, is harsh and brittle, containing a very large proportion of waste, which would tell very seriously against it, in dressing it. Whether it would be suitable for ropemaking in England, I cannot with certainty say. The price at which Mr. Wingfield states the fibre can be procured, 25 @ 35 seers the Rupee, if our bazar weight is meant, would make the cost in England £14 @ 16 ꝑ ton, a price at which I would not think it safe to ship an unknown fibre, such as Sunnee, except as by way of experiment.

No. 4. Flax.—Of this specimen nothing favourable can be said. Its shortness would not be so much against it, if it had been clean and strong; but the fibre is so weak that any attempt to dress it would reduce the whole to tow. No value can be put upon it.

No. 5. Specimen of cloth made from the Sunnee fibre. Cloth so thick and heavy, and of such narrow width, would be of no use here; but gunny cloth made from such fibre would be more valuable than the usual description of jute gunny cloth, being more durable, although this might be counterbalanced by the greater difficulty in working the Sunnee, as compared with jute.

From COL. HANNAY's *Specimens, Debroghur, Upper Assam.* *A*, *B* and *C*.—These three are good, strong, clean fibres, but in commerce would all be classed only as jute, being fit for nothing for which the latter is not applicable. As labour in Assam is at present only procurable to a very limited extent, and at double its cost in Bengal, there is no chance, under existing circumstances, of such fibres competing successfully here with the jute of lower Bengal, independently altogether of the fact of their having to pay river carriage for three times the distance, and to incur increased river risk in the same degree. They may, however, for local consumption, become serviceable.

D. Machaki fibre.—This is a fibre upon which I cannot offer an opinion. It may be fit for making into a description of rope, and, on that point, Mr. Stalkartt can no doubt give a practical report.*

From BABOO PARBUTTY CHURN BANERJEE. Three samples of Sylhet jute.—These are of very good quality, and better as a whole than the other four samples accompanying them. No difference exists between Nos. 1 and 2, and although they are a little reddish in colour, still they may very properly both be classed as fair No. 1 quality of jute. The only real objection to them, being the quantity of bark, which ought to have been removed by more careful washing, after the process of steeping had been completed. There are also one or two runners, as they are called, in these samples; that is pieces of the wood of the plant with the fibre adhering to them, arising from under steeping. Where these are found, they should be carefully picked out, as their presence materially damages the jute, by diminishing the facility of working it. The 3rd quality of the Sylhet jute is of different lengths, a great fault, and which should be carefully avoided in assorting. The longer portion is a good No. 3 quality, while the shorter would only rank as No. 4 jute.

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* The specimens were sent to Mr. Stalkartt, but he has not reported on them.

With regard to the Baboo's request to be informed as to some mode of getting rid of the reddish colour in jute, I am sorry I cannot offer any really practical suggestion. I have heard various reasons assigned as the cause, but none of them appeared conclusive. The Baboo might however easily try the experiment, which the opinion he mentions would suggest, namely, that of taking a quantity of jute, which had been cut for some time, and steeping it along with a separate quantity of newly cut jut After both were sufficiently steeped, the color of each quantity would bear out the opinion or disprove it. The experiment might also be repeated several times for the sake of greater certainty. The whiter in colour, with brightness, the more valuable is the jute, but unless the reddish hue amounts to what is called a "foxy colour," it is not so very objectionable.

CALCUTTA: WM. THOMSON.
15th *August*, 1855.

I have examined all the samples of fibre referred to in the Secretary's letter to the Committee of the 28th July. I have also carefully considered all that Mr. Thomson has said thereon, and I find he has left but little room for further report on them.

I think Mr. Wingfield's No. 3 Sunnee fibre has been prepared by manual labour without steeping; it is strong, and in my opinion this method of preparation is better for this fibre than by steeping. It could be used as it is, either for rope-making alone, or as an article for mixing with the ordinary qualities of hemp. If I am right in this view, it would soon fetch a higher price than jute in most markets.

No. 4 Flax, has been much oversteeped, and it is too weak from this cause for any other use than paper fibre; it is very short in staple. I think it would be a better plan to commence with, in all experiments upon flax straw, not to steep it at all, but to extract as much of the woody stalk by mechanical means as possible, and to send it forward in that half prepared state. I send a small specimen, half the stalk left in its original state, the other half deprived of the wood.

No. 5. Specimen of cloth made from Sunnee fibre, is a first-rate article for some purposes, as used by the natives, who stitch the narrow strips together. I think it would make good sacks and bags for most purposes, if prepared of a softer texture.

Mr. Thomson's remarks are so much to the purpose, and agree with my own ideas as regards the other samples, that I do not consider it necessary to report upon them further.

CALCUTTA :
7th September, 1855. WM. HAWORTH.

Note regarding the Water Rush of Southern Africa, with a recommendation for its cultivation in India. By Major J. A. Weller, *Superintending Engineer, N. W. Provinces.*

I have the honor to solicit your kind co-operation, towards attempting in India the cultivation of the Cape "Water Rush," which, in South Africa, produces a compact and handsome thatching material, that is well known to last 30, and even 50 years, without repair.

2nd.—This rush grows wild at the Cape, in marshy ground, in tufts of about four feet high, and I am informed that the best time for sowing it, is when the summer sun is drying up the winter rains, which at the Cape would be about November; and the seed should be thinly sown, on marshy, but not too wet ground, by merely throwing it over the surface.

3rd.—Perhaps, however, it would be expedient for India, to sow about the beginning and end of the rains, partly on the surface, and partly harrowed in, upon roughly ploughed ground.

And the borders of jheels and rice fields would seem favorable localities. Indeed for rice fields the rush might prove a convenient and profitable border; and there is nothing in the climate of India, frost excepted, (which is very rare about Cape Town) that should prevent the introduction of this valuable thatching material. So at least I venture to hope, and if by your kind aid the rush can have a fair trial, I shall feel much obliged.

A small quantity of the seed, gathered about November last, will be despatched to your address, and I trust you will kindly be at the trouble of receiving and trying it.

Agra: 19*th June*, 1855.

[The above seed has been distributed to 50 members of the Society resident in various parts of India. The reports received to the present time (December, 1855,) are all unfavorable, the seed having failed to germinate. The same unfortunate result attended a supply of the same description of seed which was sent to the Society, direct from the Cape of Good Hope, by A. Sconce, Esq., C. S., in July, 1852. The Society have directed their seedsmen at the Cape to send plants of this valuable rush in a Ward's case, with seed sown on the surface of the soil.]

Report on trials made in the Punjab with Chinese seeds received from Mr. Robert Fortune. *By* J. H. Prinsep, Esq., C. S.

Dear Sir,—In a former letter I undertook to send you some specimens of the produce from the Chinese seeds the Society were pleased to favor me with. I now fulfil, though but partially, that promise, and advise you of the despatch to-day of a small tin box, containing some samples of the Chinese rice, &c., grown from the seed sent over by Mr. Fortune from China.

There are five kinds of rice, all of which were shewn to a native of a part of this district, which bears a good name for rice; only one kind was considered to be at all good, and that even in cooking turned out red in colour, and very inferior.

Though a considerable quantity of rice is grown in this district, this is not an essentially rice-district, being entirely eclipsed by the neighbouring large rice-cultivations of Kangra.

The Chinese millet-seed now sent was grown in the rainy season, and corresponds exactly with the "sawank" of this country, and resembles Canary seed.

I have enclosed a packet of the Chinese hemp seed, or "Tung-ma," I think is its name,—together with a little of the fibre produced from the same plant.

This, and the *Brassica Chinensis,* form the only two successful experiments of all the Chinese seeds I received. The

Tungma was sown shortly after it reached me last hot weather, grew very strong, and was cut down in August. The fibre I much fear you will find to be very weak and indifferent. I send with it a sample of the common country grown "sunn," or hemp, which though much coarser, will prove far stronger and useful for ordinary purposes. This again is not to be compared with the wild hemp of the Kangra hill.

The great objection to the Tung-ma made by the people to whom I gave it for the purpose, was the difficulty in beating it sufficiently soft, as to enable the fibre to peel off.

Had I the opportunity, I should be glad to try the wild hemp of the hills in a cultivated state, but being on the point of leaving this part of the Punjab, I must bid adieu to all experimentalizing.

The Chinese indigo I sowed has failed entirely, the seed germinated scantily, and though sown in the hot weather, has not attained a greater height up to the present time than $\frac{3}{4}$ of a foot, if so much, and in appearance differs greatly from the indigo of Hindostan or the Punjab, being whiter and longer in the leaf.

The Chinese cabbage is now in full leaf, with here and there a sprinkling of flowers. The plant to look at is a nondescript cabbage, the root is the same as that of the Brassica species, but the leaves and flower are exactly like the turnip, the only perceptible difference being in the bushy quantity of leaves. I hope to realize a good crop of seed from which Mr. Fortune informs us a good kind of oil can be pressed.

The melons, palm, date, green dye, and plant from which preserve is made, all failed.

I send you a specimen of some three years' old American cotton grown in my garden. It looks very fine and soft. The bushes from which it has been picked have been in the ground for two years, they were cut down at the end of the first year, and allowed to spring up again; the produce I think is better than the first year's. The soil of my garden, I should tell you, is not at all rich and loamy, but sandy, and requiring manure to give it a firmness, and make it yield. Hoping you will do with these samples whatever you think fit.

BUTTALA: Believe me, Yours, &c.,
February 13, 1855. J. H. PRINSEP.

Report by the Society's Committee on the above sample of Cotton.

Color, length and strength of the fibre, and its feel or touch, is excellent. It is descended, apparently, from the green seed, or short stapled variety, either Pettigulph or New Orleans, and is a good and useful cotton for the European markets; when cleaned, it might bring in Liverpool 4½d to 5d per ℔.

Observations on the wild Cochineal of the N. W. Provinces of India and the Punjab. By DR. T. E. DEMPSTER.

[The following interesting observations have been submitted to the Society by Dr. Dempster, in consequence of a request recently made to him for any notes in his possession respecting the experiments which he instituted in 1847 on the wild Cochineal of the N. W. Provinces and Punjab. The Committee of Papers have much pleasure in introducing these remarks as a sequel to the correspondence and report on the Cochineal of the Punjab, which was published in a previous number of the Journal, Vol. VII, Part 1.]

A. H. BLECHYNDEN, Esq.,
Secretary Agri-Hort. Society, Calcutta.

DEAR SIR,—I have the pleasure to acknowledge the receipt of your letter of the 28th of September, 1855.

In 1848 I was led to make certain observations on the wild cochineal of the North West Provinces and Punjab, that year unusually abundant in the vicinity of Loodianah, and to institute certain experiments to ascertain the quality and quantity of the colouring matter contained in the indigenous insects. I had then reason to believe the subject would turn out of commercial importance, and therefore considered it one which might, with propriety, be brought to the notice of Government.

After much trouble and a variety of experiments, I succeeded in producing, with the Indian cochineal, fast dyed tints, the brilliancy of which astonished and interested all who saw them. I still believe the result of my enquiries and experiments, at least, curious and interesting; and, as I have retained the original documents in my possession, I have much pleasure in sending you copies of them.

I am well aware, that not only has the existence of a cochineal insect in Hindoostan been long known, but that attempts have, from time to time, been made to extract from it a dye of commercial value. As far however as my information goes, all such attempts have signally failed. If any one has heretofore produced with the Indian cochineal *such colours* as I forwarded to Calcutta, or even suggested the propriety of cultivating and improving an ascertained good indigenous species, instead of trying to naturalize a foreign one, then, I can claim nothing on the score of originality; but even in that case, the results of my experiments stand on their own intrinsic merits, and, I think, equally claim notice and further investigation.

From a combination of favourable circumstances, not well understood, all the insect tribes are subject, at uncertain intervals, to seasons of excessive propagation. When this takes place, parasitic insects often entirely devour the plants on which they naturally feed, and so cut off the means of such excessive reproduction in the succeeding season. I presume this is the natural check to an increase of creatures which might prove fatal even to man himself. This is precisely what took place in the Punjab in 1848; the ungathered myriads of the cochineal insects completely destroyed, for a time, all the cactus plants in the district.

The only objection to my proposal which occurred to Mr. Lawrence, the Chief Commissioner of Lahore, was, that the cochineal insect appeared to him to destroy the cactus altogether,—"to eat it up root and branch," and so to render continued propagation by such food impracticable. But if it was, as I am persuaded, the *excessive* number of insects which alone proved fatal to the plants, the obvious remedy is to *gather* and *use* them, leaving only enough for the succeeding crop.

I do not know how my specimens have been kept for the past seven years; but if not carefully shut up, it will be proper, in order to form a correct judgment of what they originally were, to consider how far the finest Europe-dyed scarlets would have lost their brilliancy, if exposed for an equal period to the hot damp air of Calcutta.

I have one suggestion to add to those contained in my original paper, and perhaps it will be found the most important of all. It is well known that we made no real progress in the cultivation and preparation of Indian tea until we obtained the aid of native Chinese brought up to the work; so, I believe, our success in "breeding," improving, and preparing, an Indian cochineal, will depend on importing a few native Mexicans from the best cochineal districts. Of what value the fullest success would be in a commercial point of view, I have no correct means of judging.

I remain, &c.,

ON THE RIVER ABOVE DHAUGULPORE: T. E. DEMPSTER.
5th October, 1855.

The following remarks on the wild cochineal of the North West Provinces of India appear to me to be sufficiently important to deserve the attention of Government, and under this impression I have the honour respectfully to submit them for the consideration of the Right Honourable the Governor-General.

The existence of a cochineal insect in most parts of Hindostan has been long and generally known, but it has hitherto been regarded as so inferior in quality as to be altogether worthless as an article of commerce. A short time ago my attention was accidentally called to the unusual abundance of the insect this year in the immediate neighbourhood of Loodianah.. This led me to collect a considerable quantity of them, to examine them minutely, and to make certain experiments to determine the quality and quantity of the colouring matter they contained. The following is a brief account of the results of my observations.

I found the female insect to agree in all essential characters with the description given by Cuvier of the true Mexican *Coccus cacti.* The size however was smaller. It was distinguished from the female kermes, by preserving in its advanced stage the distinct form of an insect, and never becoming a mere berry or gall.

I discovered a very small proportion of young perfect male insects. In comparing them with the drawings of the male of the Mexican species, and of the male kermes, I found that the indigenous insect was not identical with either, although in general appearance it most resembled the male kermes. The Indian *coccus* is found only on the common cactus or prickly pear of these provinces, and is surrounded by a quantity of fine cottony matter, into which the female deposits her young. It is beyond all doubt a true *Coccus cacti;* and although it will probably turn out to be of a distinct and separate species, it agrees very closely with the description given of the woodland or wild cochineal of

Mexico. In the month of December the young brood were extremely numerous, very lively, and ready to leave the mother, and spread themselves over the plants. Sulphate of alumina added to an alkaline solution of the colouring matter of the native cochineal, threw down a copious deposit, which, when collected and dried, turned out a lake equal in beauty to the purple lakes found in Ackerman's colour boxes.

My attempts to make fine carmine were not so successful; but the process, even with the finest Mexican cochineal, is known to be tedious, difficult, and liable to failure. My experiments in dyeing woollen cloth with the Indian cochineal have been eminently successful, and have far exceeded my expectations. Using the formulæ employed in Europe for dyeing scarlet with Mexican cochineal, I substituted the indigenous colouring matter, and produced tints which, I think, will be pronounced equal in brilliancy to the best Europe-dyed scarlet broad cloth. After a little practical experience in the manipulation, I can now reproduce these colours with perfect certainty, and have thus, I believe, satisfactorily established the important fact that the colouring matter of the *coccus* of this *part* of *India* is *equal in quality* to that of the Mexican cochineal.

The accompanying specimens of woollen cloth fast dyed with the indigenous cochineal, will best support this opinion. Some of them, viz. the merinos have been dyed more than a month, and have been repeatedly, and well washed, so that there can be as little doubt of the permanency as of the beauty of the colours. If I, after a few trials, can produce these tints, what may not the experienced European dyer effect with such a colouring matter? I find here an imported cochineal, brought from Bombay, the price of which is quoted in a recent Bombay price current at 4½ Rupees a pound. It is sold in the city of Loodianah, and is used by the Cashmere shawl-dyers. I took equal weights of the native and imported cochineal, extracted the colouring matter from both, with exactly equal quantities of the same chemical re-agents, and conducted the process in both cases precisely in the same manner. The quantity of lake obtained from the native cochineal *exceeded* that got from the imported article!—the former was also of a more brilliant hue!

The quantity of native cochineal which I found capable of dyeing a certain weight of woollen cloth, proves that the indigenous insects contain an amount of colouring matter not inferior to the fine Mexican cochineal. But as this is a point of much practical importance, I will, if required, forward a specimen of the insects to Dr. O'Shaughnessy in Calcutta for more accurate analysis.

The native cochineal, when dried, has an unseemly appearance, being covered with much cottony matter, which adds considerably to the bulk, though not much to the weight. Yet, if I have not deceived myself as to the quality and quantity of the colouring matter contained in a given weight, I am persuaded it must be of commercial value even in its present unimproved state. *

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* *Extract of a letter from Dr. Dempster, dated Dinapore, 4th March,* 1856 : —

"I have the pleasure to acknowledge the receipt of your letter of the 25th ultimo, and am pleased to learn that the colours of my specimens of Cochineal dyed cloth are, after the lapse of so many years, still so bright and good as to attract the notice of members practically conversant with the subject.

"In introducing my observations on the tried Cochineal of the N. W. Provinces. I hope you will do me the favor to explain, that although I had expressly applied for information, I was ignorant of much that had been already done, and was thus naturally misled both as to the importance and originality of my Loodianah experiments.

" I have been carefully looking over my old papers, but regret to say I cannot find the slips on which I noted the exact quantities of dye and cloth used in making comparative trials. I can only safely assert that, on such occasions, the weights, both of the dye and cloth used, were scrupulously equal.

I am however well aware how much this want detracts from the value of my experiments."

The natural history of the Mexican coccus shows :—

1*st.*—That the production of the fine dye is confined within certain geographical limits.

2*nd.*—That the wild species *can be greatly improved by culture and judicious management.* The North-West Provinces of India (including the hill districts) present a great variety of climate, soil, elevation, &c., circumstances which must tend to modify the character of plants, and the nature of the insects which feed upon them; due favourable locality appears to be already found, and others even more favourable may be discovered. There are immense tracts of waste and uncultivated lands, on which the cactus may be planted, and where it would grow luxuriantly. We have already one indigenous cactus, capable of supporting a cochineal insect of the quality above described; and the true Mexican nopal, or *Cactus cochinillifera* is thriving in the Botanical Gardens of Calcutta, and can easily be transferred to suitable localities in these provinces. Lastly, labour is cheap, and little agricultural management requisite. My proposal therefore is, first to examine a variety of localities both in the Hills and open country in the plains ;—to ascertain where the indigeous cactus grows most luxuriantly, and where a cochineal of the finest quality is naturally produced. A sufficient number of such localities being selected, (and it is very probable, as suggested by Dr. McClelland that some of the sheltered valleys in the Hills at a moderate elevation will be found best suited to the Mexican *Opuntiæ*), let portions of ground be planted both with the indigenous and Mexican plants ; and let the native coccus be "set" at proper seasons, and "brought up" on the cultivated plants, as the natives of Mexico set and bring up the wild cochineal on the garden nopal. The success of a similar experiment in Java (of which I was not aware until the receipt of Dr. McClelland's letter,) leads me to anticipate a similar result in these provinces ; and if so, we may be able to transfer to British India a great portion of this valuable trade, at a time when the political state of Mexico would seem to favour the attempt.

It is highly probable (as conjectured by Dr. McClelland,) that the failure of all former efforts to produce a fine cochineal dye in India, is mainly to be ascribed to the selection of unfavourable localities, and the attempt to introduce a foreign insect, instead of cultivating and improving an indigenous one.

Besides the selection of proper localities for the cultivation of the *Opuntiæ,* correct information must be obtained on the following points, viz.:—

1*st.*—Number of generations of the coccus in India during the year.

2*nd.*—Number of crops which can be profitably gathered in twelve months, and proper periods of *gathering them.*

3*rd.*—Proper seasons for *setting* the young insects.

4*th.*—Most effectual mode of preserving the insects during the rainy reason. I annex copy of a letter from Dr. McClelland, the officer then in charge of the Calcutta Botanical Gardens, to the address of Dr. Edlin, to whom I wrote stating my views on this subject—sending specimens of dyed woollen,—and soliciting information regarding any experiments which may have been formerly made in Calcutta; and the state of the Mexican cactus plants in the Botanical Gardens.

(Signed,) T. E. DEMPSTER,
LOODIANAH: *Surg.* 1*st Brigade H. A.*
28*th February,* 1848.

Copy of a letter from DR. MCCLELLAND *to the address of* DR. EDLIN.

I have read the enclosed with much attention, and fully coincide with Dr. Dempster as to the importance and interest of the subject, and shall be most happy from time to time to afford him any advice in my power.

The attention of the Government and the public has, at various times been directed to the propagation of cochineal, both in Bengal and Madras, but like many other important objects, it has been abandoned as often as it was begun, and at this time Dr. Dempster's proposal comes upon us with all the interest of a new proposal.

The Dutch have been more successful; and I learned from a Civil servant of the Dutch Government at Java, who paid a visit to Calcutta about two years since, that cochineal had then become one of the great sources of public revenue in their Eastern possessions.

About the time that trials were made extensively at Madras, Dr. Roxburgh was engaged in similar trials here, and planted several acres, in the Botanic Garden, of *Opuntia cochinillifera.* No record exists, so far as I can learn, of the result of the experiment, or why it was abandoned; but from the circumstance of a reward having been, I presume shortly after, offered by the Court of Directors for the introduction of the *Grana fina,* or species of coccus employed in South America, into India, I presume some difficulties arose as to the employment of the indigenous species of Bengal.

In 1839, the South American insect was introduced by the Agri-Horticultural Society, and an acre of ground or thereabouts laid out in the Society's nursery for its cultivation, which was likewise abandoned; but for what reason does not, so far as I can learn, distinctly appear.*

In this, as in other matters, my own opinion is, that too much importance was attached to the introduction of this species, and that we should rather have endeavoured to cultivate our own indigenous sort, than trust to the introduction of foreign kinds; and it is that part of Dr. Dempster's note which bears upon this view of the case, that I regard as most important, particularly as every facility now exists for the extension of trials under the most favourable circumstances.

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* Several attempts were made to introduce the *Grana fina,* but they proved unsuccessful. Some interesting information on this subject, combined with many useful facts, regarding the habits and peculiarities of the wild and domesticated insect, was published by the Society in 1839, as an appendix to the sixth volume of its *Transactions.*—Eds.

The insects seem to thrive on our own indigenous species of *Opuntia,* but as we have abundance of the South American plant, *O. cochinillifera,* that species may also be tried along with the several sorts of our own, and Dr. Dempster may have cases of the plant sent up to Kumaon from the Botanic Garden without any difficulty or expense, further than that of carriage from Allahabad. I have no doubt the failure of attempts to cultivate and improve the insect, has been owing to their having been made in unsuitable climates, and that Kumaon is much better adapted to the object than the open plains of Bengal.

Nothing can be finer or more beautiful than the colour extracted by Dr. Dempster from the native insects of that Province, and I feel assured from the success that has attended the cultivation in Java, that there is nothing more required to insure similar success here, than the necessary amount of intelligence and perseverance on the part of those who may undertake the object.

BOTANICAL GARDEN, CALCUTTA:
13*th February*, 1848.

Copy of a letter from DR. A. FLEMING *to my address, dated Gindiala, one march from Umritsur en route to Lahore. March 3rd,* 1848.

When marching past this village to get to my tent this morning, I got satisfactory proof that the Indian cochineal is an *article of commerce* in the country, and is used extensively by the Umritsur dyers. All the roadsides and fields near this village are lined with magnificent specimens of the cactus, far superior to any I have seen since I left Loodianah, and their leaves are covered with the cochineal insect, which it strikes me attains here, probably from good feeding, a larger size than I have ever seen it before do. As I passed these hedges of the prickly pear, numerous Cashmerees were scraping the cochineal with a blunt iron instrument from the surface of the leaves, into a basket such as the natives use for winnowing corn. On asking them what they were collecting this for, they told me it was to sell to the Umritsur dyers, who give them one Rupee for the "Angrezi seer" of the substance, *when dry*. In order to dry it, they rub the cottony matter and the insect into balls of a soft consistence, and then dry this in the sun on a *sirky* mat. By this process the insects are squeezed, and their colouring matter absorbed by their cottony envelope. The collecting of the cochineal must be rather a profitable concern for the gatherers of it, as one man whom I watched, in about two or three hours, had collected about four seers of the substance. In Cashmere, the Indian cochineal sells for half seer for one Rupee, and hence one would infer that the insect is scarcer there than in this part of the world. I was indeed delighted to have hit thus accidentally on a proof of cochineal being at present an article of commerce in this part of the world, and as I have no doubt you will be glad to hear any particulars about the substance, I give you the facts as I got them.

Copy of a letter from J. THORNTON, ESQ., *Secretary to Government N. W. Provinces, to* DR. DEMPSTER, *Dated Agra,* 1*st April,* 1848.

I have shown your letter to me of the 6th instant, with its accompaniments, to the Lieut. Governor, Mr. Thomason has read with much interest the account which you give of your experiments in dyeing with the indigenous cochineal insect.

Certainly the specimens which accompanied your letter are a complete evidence of your success, and it only remains to be seen whether the experiment could be conducted on a large scale, and how it would be remunerative, if so conducted. You are aware that the Lieut. Governor has no official connection with the part of the country to which your papers refer. You could not, however, have put your observations into better hands than those of Mr. Elliot, who will doubtless do all that is necessary to draw public attention to the subject. We are just beginning to learn in the matter of cotton, that the best plan is to pay attention to the indigenous plant, instead of attempting to introduce foreign varieties, and it may well be the same with the cochineal.

Notices respecting the culture and manufacture of tea at Cachar, Munneepore and Darjeeling.

During the present year (1855) the Society has received specimens of tea grown and prepared at the above mentioned localities. Though the particulars were duly brought to notice at the several general meetings when the specimens were presented, it is deemed desirable to re-introduce them in this place for the sake of a more permanent record.

I. *Cachar Tea.*—In May, the Society received from F. Skipwith, Esq., Judge at Sylhet, specimens of what he supposed to be the tea plant, gathered in the Cachar district, where it grows luxuriantly on the slopes of the hills. "Natives who have been employed by the Assam Tea Company," adds Mr. Skipwith, "declare them to be precisely similar to the Assam plants." The specimens in question were forwarded to Mr. Skipwith by Capt. Verner, the Superintendent of Cachar. Dr. Thomson, Superintendent H. C. Botanic Garden, to whom the specimens were referred, reported that they were less complete than he could have wished, "but to all appearance they are identical with the tea plant of Assam. The leaves and branchlets certainly exhibit no difference. There are no capsules with the specimens, but five or six loose seeds which closely resemble those of the tea plant."

In the following month (June), Capt. Verner forwarded more perfect specimens, including the immature fruit, which were also submitted to Dr. Thomson, who reported them to belong to the Assam variety of the tea plant. "The capsules now sent," adds Dr. Thomson, "place this beyond doubt in my mind." In his communication advising the despatch of these specimens, Capt. Verner offers the following remarks:

"I was very glad indeed to find from your letter and from Dr. Thomson's report, that the Cachar plant appeared to be identical with the tea plant of Assam, and as Cachar is so easy of access at all times of the year, with a fine river, the Burah, running through it, I trust before long to see large tea plantations in it. The tea plant grows in the jungles at some distance, ten to twenty miles from this station, on low hill lands. In one place, 'Burraliangun' there are some fifteen to twenty acres of land covered with the plant, there are a number of large trees, and below no end of young plants; the large trees are at present covered with young fruit. No doubt the plant, on being searched for, will be found in many places."

In August, Capt. Verner submitted two specimens of tea, with the following communication:—

"Having had a very small quantity of tea manufactured from the tea plant of Cachar, I have the pleasure of informing you, that I have this day despatched by dâk banghy a small packet addressed to you, containing a sample thereof, and which I request you will do me the favor of submitting to the Agri-Horticultural Society on the first occasion.

"The leaves of which the tea is composed, were gathered in the jungles from the indigenous plant of this province. This tea has not been manufactured by a regular tea manufacturer, but by a person who has been in the habit of seeing tea made in Assam; some allowance must therefore be made for his want of skill. My object in submitting the sample is, that those interested in tea, might be able to ascertain, from its flavor and color, what Cachar tea, when properly manufactured, might turn out.

"I am not of opinion that the Cachar and Assam plant are of the same variety. The Cachar leaves, when dried, are much lighter colored than the Assam, they are also I believe thinner. Tea made of Cachar tea differs also in flavor and color from that made of Assam tea. The Assam, that I have seen, is strong, black, dark colored tea, the Cachar is brighter in color, and when milk is poured on, then the difference is great, the one looking dark and muddy, the other more bright and clear. The tea leaves taken out of the teapot and compared, show that they are different. The Assam leaves being dark brown, and the Cachar more of a green brown. There is a slight peculiarity of flavor in the Cachar tea, which may be, owing to the manufacture, to there having only been a very small quantity made, also to the leaves having been gathered in the jungles, and to the plant not having been cultivated. I would esteem it a great favor if the opinion of any competent person or persons could be obtained as to what the tea might turn out when cultivated and properly manufactured."

The specimens in question were submitted to Mr. Joseph Agabeg of this city, a gentleman who has considerable experience of the article, and who reported on them as follows :—

"I am happy to tell you that these samples are much superior in quality to those you sent me last, [Munneepore], the leaves resembling China Souchong and Pouchong after they are boiled. I have no hesitation in saying that, With care in preparation, this tea will considerably improve, and as the quality of plant seems to me of superior kind, it is worth attention and encouragement in future. I have also the pleasure to enclose the opinion of Mr. F. Pereira, whose knowledge and experience in the tea trade is greater than mine, and as such will be doubtless valued by the Society."

Report by Mr. Pereira.—"I find this tea of very fair quality indeed, and well prepared; the sample has too much of the stem in it, but the leaf is good, and on examination with some black tea, I find, after boiling it, that the leaves resemble the China leaves very much, of a light brown color, without much of the green, and I think if the tea had been prepared when more green, it would have had a better flavor."

In a letter dated 23rd October, after acknowledging the receipt of the above reports, and expressing his gratification at their contents, which were even more satisfactory than he had reason to expect, Capt. Verner goes on to observe: "I hope that when the plant is cultivated and properly manufactured, that really good tea will be turned out of Cachar. I am in great hopes that the cultivation of the plant will be carried on with energy. Three parties have commenced work, and six other European speculators have applied for tea lands, which promises well, considering that it is only some three or four months since it was ascertained that the indigenous plant was growing in the jungles of my district; and for all which I am much indebted to you and the Society."

II. *Tea from Munneepore.*—In June, 1855, the Society received from R. Houstoun, Esq. C. S., four specimens of tea grown and manufactured in Munneepore by the natives, assisted by Assamese, without European assistance, or supervision of any kind. The following is extract of Mr. Houstoun's memorandum on these specimens:—

"I send you four samples of tea from I believe the same plant as is the specimen Mr. Skipwith sent you, and from the variety, I believe, that produces the Assam tea, and I think from the same *line* of country as where Mr. Skipwith obtained his specimen plant, if not from the same spot, the tea range running from Sylhet on to the Bhanmo of Marco Polo's time on the Upper Irrawaddy, thence by the Chinese caravan routes through Yunnan to Pekin, and probably along *part* of the route to the Shan States. I cannot describe to what latitude south the tract extends, though it touches Assam on the North in some parts. The tract produces opium, salt, silver, gold, cinnamon in all its varieties, as Cassia lignea, and vera, long staple cotton, coffee, Chinese varnishes, all the drugs of the ancients, and camphor. Coffee has in fact been found wild all about Sylhet for three quarters of a century, and of the same description as the cultivated kind, and tea has been found for a quarter of a century what we may call close to the same spot as the coffee; and full 70,000 bales of principally long staple cotton has been for years annually sold at Bhanmo for the Chinese. I can let you have as much more of each sample of this tea as you may require, though I want for the East India Company's Museum as much of these particular samples back as you can return me, and your opinion, and all other opinions you can obtain, as to the price each sample would fetch in this and in the English market, and any faults in the preparation: whatever in fact would be useful for those ignorant of the preparation and trade, and anxious to enter into it either themselves, or to instruct others on either points."

The specimens in question were referred to Mr. Agabeg, who reported on them as follows:—

No. 1.—Is a very strong flavored tea, small leaves, and very bitter.

No. 2.—Much the same as No. 1., but from a different plant; the leaves are larger, and appear to have been gathered too early, in consequence of which perhaps it is not so strong as No. 1.

No. 3.—Is a very inferior tea to the others, the leaves resembling No. 1. in size.

These three samples are very badly manufactured, and are totally unfit, in their present state, for the Calcutta market, being even inferior to the low qualities of common Junk tea, which are brought from Amoy to Singapore, and sold there at 2½ to 3 Rs. a box of 20 catties; or 25℔.

I have also tried them together, thus they gave a better taste than separately, but I found them inferior to Burmah tea, which is brought here from Bamoo viâ Ameerapoorah, and sold to the Affghans, Cashmerees, and other Himalayan tribes.

No. 1. Sweet Species. } Is the best tea of all; the leaves appear better prepared, and it is not so bitter; this tea, with care in its manufacture, would be superior to the Assam teas I have yet seen; it may not however approach to the Oolong, Pouchong, or any first marks of China Teas; in its present state, I cannot form a value for the Calcutta market, and unless it is sent to England in its perfect state, it is doubtful if any value can be put upon it in the London market."

III. *Tea from Darjeeling.*—This tea was submitted at the general meeting of the Society in November, 1855, by Dr. Thomson, on behalf of Dr. Campbell, Superintendent of Darjeeling; it was unaccompanied by any information, save that it had been grown and manufactured at Darjeeling by Capt. Masson.

Messrs. Francisco Pereira and Joseph Agabeg, to whom this specimen was referred, have favored the Society with the following Report, dated 21st November, 1855:—

"We have tried the tea, which appears to us of very fair quality, and we are of opinion that, with a little care in the manufacture, it will improve, and be equal to the Assam teas we have tasted.

"From the appearance of the Darjeeling tea, we think that the plants from which the musters were manufactured, are not of the same kind, and we think each kind of the tea should be manufactured separately.

"We also tried this muster mixed with plain China Pouchong, and found it very good."

Report on the discovery of the tea plant in the district of Sylhet. By F. A. GLOVER, ESQ., *Officiating Collector.*

(Communicated by the Board of Revenue.)

To the COMMISSIONER OF REVENUE, 15*th Division, Dacca.*

SIR,—In continuation of my letter, No 7, dated 4th ultimo, I have the honor to submit the accompanying report on the discovery of the tea plant in this district.

2nd.—Ever since the discovery of tea in Cachar, it had been surmised by those best qualified to form an opinion, that the plant would be found in this district, and "prospectors" had for some time been employed by the Magistrate, Mr. Larkins, in searching the neighbourhood of the hilly part of the eastern side of the district. In December last, the first discovery was made, and ever since then, reports of fresh successes have come in daily.

3rd.—You will observe from a glance at the accompanying map, that the "habitat" of the tea plant is at present mostly confined to the hilly parts of the district bordering on Cachar, Chandkanee, Chergola, and Unbeen, in Pergunnah Egarachattee, are all (as I have been given to understand) within twenty miles of the place where the tea plant was first discovered in Cachar. Several thousand plants have been found in the hills of the Ruffenuger and Chapghat Pergunnahs, and there is every prospect of a large number being discovered in Pergunnah Punchkhund. Besides these places the plant has been found growing on the numerous teelas (small detached hills, varying in height from 50 to 400 feet,) which surround the mouzah of Sowtah, and I have no doubt but that a careful search amongst the teelas in other parts of the district, particularly in those close to the station of Sylhet, would be rewarded by finding the tea plant growing in most of them. As far as I have been able to ascertain, the soil of these teelas is the same all over the district, and there can be no reasonable doubt, but that if the tea be found to thrive on one it would grow equally well on all.

4th.—I should have preferred delaying this report until I could have established the fact of the tea plant being found on all these teelas, enough however has been done, to show that there exist in various parts of the district, thousands of acres of land capable of being turned into thriving tea plantations. I desire to offer a few remarks on the different localities where the tea plant has up to this time been found. The first thing to be considered is the nature of the lands (I use the word in its "fiscal" sense,) where the discovery has been made. If it be found that the lands where the tea plant grows are included in any one's permanent settlement, the value of the discovery to tea-planters will be sensibly diminished, indeed Sylhet under such circumstances, can never compete with Cachar, where land is, I understand, given freely in Government grants, at trifling rents and long leases. The planter would of course prefer a district where he could commence operations on such easy terms, to one where he would be dependant for his lands on the caprice of native zemindars. I think it will be found that the places in pergunnahs Egarachuttee, Chankanee and Chergola, come under this category. The greater portion, if not all, of these lands are included under the permanent settlement, and in these places Government will derive no pecuniary advantage from the discovery. Indeed I doubt whether the zemindars themselves will be much benefitted, unless they turn planters on their own account, for they can never afford to let their lands at the same rates as the Government grants in Cachar; and of course intending planters will go where the land is to be got on the longest leases, and at the cheapest rates, particularly when the expense of labor is the same in both places.

5*th.*—In Pergunnahs Ruffeenuggur and Chapghat the tea plant has been found almost entirely on waste jungle ground which has never been included in any settlement. These lands are well suited for tea plantation, and will doubtless be eagerly sought after by intending speculators. In Pergunnah Punchkhand also, the tealas are all of them unsettled land, and there also will be excellent places for plantations. If moreover, as I have every season to hope, the tea plant be found, or will grow, on the tealas near the Sudder station, Sylhet will become a very important district. From the station to nearly the foot of the Cossiah Hills, there is a succession of these tealas, varying in height and extent, but all of them apparently possessing the same peculiarities of soil and climate.

6*th.*—Since writing the above paragraph, I have received specimens of the tea plants found at a place called Golabgunge, a spot surrounded by tealas, and not above three hours' journey from Sylhet. This discovery confirms me in the supposition that tea will either be found or will certainly grow on all the hilly land near the station, and as all these lands are unsettled, the result will be a source of considerable profit to Government.

7*th.*—The greatest distance of the furthest discovered tea plantations from Sylhet does not exceed 60 miles as the crow flies; by the only practicable route, it would probably arise to 100 miles, but for three parts of this distance, water carriage would be available throughout the year, whilst in the rains (which is, I believe, the manufacturing season) boats of large burthen could go close up to the place. The tea fields in Pergunnahs Punchkand, Chapghat and Ruffeenuggur are close to the rivers Soorma and Baglia, so that there would be no difficulty in the matter of carriage in any of these localities.

8th.—I have issued directions for marking out all the waste and unsettled lands in the pergunnahs where the tea has been found, and on getting the Putwarries' reports I shall be able to tell pretty nearly the quantity of land available for grants. The amount must be very considerable.

9th.—I send herewith specimens of the tea plant together Will follow by Banghy. with seed-pods and flowers, the season for the latter has passed away, and I have been hitherto unable to procure better specimens.

10th.—In conclusion, I beg your instructions regarding the way in which the tea lands are to be leased. I do not think that it will be necessary to offer such favorable terms as in Assam, where the climate is bad, and labour very scarce. I would propose leases of from 40 to 50 years' duration, the first 10 to be at half rates, the other years at full rates. I would fix the rates at those given for the medium description of land in the pergunnah where the lands lie. In most places the jungle to be cleared would not be very heavy, whilst the expense of cultivation would be considerably smaller than in Assam. The rates I propose would assess the land at from 10 to 12 annas a koolbah for half rates.

I have, &c.,
(Signed,) F. A. GLOVER,
Offg. Collector.

P. S.—I have already received an application for 2,000 acres of the waste land lying to the north of this station.

Selections, &c.

A list of the principal trees found in the forests of Pegu, with remarks on the practical uses to which the timber, the flowers, and the fruits may be adapted.

White wood.—Eighty-five species are soft and useless, being only fit for fuel. Many of them however are valuable, either for their fruit, gums, oil-seed or spices; others, for their close and compact structure, are employed in the manufacture of small ware, as a species of *Nauclea* used for making combs, and two species of *Erythrina* yield the light charcoal employed in the manufacture of gunpowder.

These light woods, useless as timber, belong to the families of *Urticaceæ* (including more than twenty species of *Ficus*,) and *Sterculiaceæ*, *Laurinea*, *Rubiaceæ*, *Myristicaceæ*, *Anonaceæ*, *Spondiaceæ* and *Bignoniaceæ*, with odd species from other families.

The remaining white woods, twenty-five in number, valuable for their strength and closeness of grain, demand a more extended notice. Seventeen of these are fit for house-building, and eight, from the hardness and fineness of their grain, render them-valuable as fancy woods for cabinet making.

Red-colored woods.—These are twenty-five in number, seven of which, from their strength and solidity, are adapted for the various purposes of house-building; seven, from the elegance of their grain and color, are suited to the various purposes for which mahogany is used, and eleven are suited to the finer purposes of fancy cabinet work.

Yellow-woods.—These are three in number, hard and fine grained, and suited to fancy purposes.

Dark-brown woods.—These are twelve in number, and are all valuable. Eleven are adapted for house-building, and probably for ship-building, and one for special purposes requiring great strength and hardness.

Black woods.—These consist of four different kinds, all of which are valuable for their strength and hardness.

Light-brown woods.—There are seven varieties of this colored wood, embracing all the timber of most value in the Province, exclusive of teak.

List of white-colored woods.

Nos. 1 to 17 are adapted to every purpose of house-building.

Nos. 18 to 25 are adapted for fancy work and cabinet making.

No. 1.—*Hibiscus macrophylla* is very plentiful in forests of the Pegu and Tounghoo districts. It is a tall slender timber, of three or four feet girth, and would do for boards and house posts.

Bokemaiza.

No. 2.—*Kydia calycina* is plentiful throughout the forests, more especially in the Pegu and Tounghoo districts. The small saplings are used, from their great strength and elasticity, by the natives, for måking banghy sticks, but it is large enough to afford timber of three or four feet girth.

Let-pan.

No. 3.—*Eriolæna tilifolia* grows plentifully throughout the Pegu and Tounghoo districts, attaining a height of fifty feet, with a girth of seven or eight feet sometimes, but usually about six feet. It is a strong tough timber, similar in its properties to Kydia.

Gwai-douk.

No. 4.—*Connarus speciosa.* Plentiful in all the forests, growing scattered with teak in the Tounghoo district and in the forests of Pegu. It is a large, heavy and strong timber.

Myat-yah.

No. 5.—*Grewia floribunda.* A very common tree from Rangoon to Tounghoo. It is a good serviceable timber for all ordinary purposes of house-building. There are three other species of *Grewia*—*G. asiatica* is a large tree like *G. floribunda*, but not so plentiful. The other two kinds are small and comparatively scarce.

Phet-woon.

No. 6.—*Grewia spectabilis* and *G. Hookerii.* Both very plentiful, and of a quality like the last mentioned. They attain a girth of about three to four feet, and grow up tall and remarkably straight. They are found with teak in the forests of Pegu and Tounghoo.

Hseik-kyee.

No. 7.—*Sapindus rubiginosa.* This tree is not very plentiful. It is found in the Pegu district, where it attains a girth of three or four feet, growing tall in proportion and straight.

No. 8.—*Millingtonia simplicifolia* is also scarce, but found in the forests of the Pegu valley. Its properties as a timber are valuable, from its weight and strength.

Theit-to.

No. 9.—*Sandoricum Indicum.* This timber is large and plentiful, both in the Rangoon and Tounghoo districts. It is one of those trees which are cultivated by the Burmese for their fruit. It is found near all large villages, but it is scarce in the forests.

No. 10.—*Amoora (Aglaia) rohitoca.* This tree is scarce, but found
Khayau-kayoe. in the Tounghoo forests.

No. 11.—*Juglans tricoca.* Scarce, but found on the banks of the streams in the Pegu district. It is a hard strong timber.
Ta-soung-let-wah.

No. 12.—*Geloxium bifarium* is found in the Rangoon district, it seldom exceeds three feet in girth, and is only fit for house posts.
Hsai-than-bayah.

No. 13.—*Excecaria agallocha.* Plentiful in the Rangoon and Tounghoo districts.
Bone-bayaza.

No. 14.—*Walsura piscidia.* This tree is very plentiful in the Pegu and Tounghoo forests, as well as in the Tharawaddy forests. The timber is large, heavy and strong.
Joe-boe.

No. 15.—*Canarium geniculatum.* This is a large and valuable timber found in the Pegu valley, but it is scarce.

No. 16.—*Indigofera sp.* This tree is four or five feet in girth. found both in the Rangoon and Tounghoo districts, though it is scarce.
Doun-daloun.

No. 17.—One *Terminalia belerica* and two *T. violata.* The latter very plentiful throughout the Pegu, Tounghoo, and Tharawaddy forests; the former less plentiful. Both are large timber, and would answer for all purposes of house-building.
1. Pangah.
2. Laibwai.

No. 18.—*Semecarpus anacardium* is a middle-sized tree, common in the Pegu and Tounghoo forests.
Chai-bin.

No. 19.—*Sibia sp (glomerata.)* Very plentiful in Prome, Pegu and Tounghoo, as well as about Donabew; a compact and close-grained wood, seven or eight feet in girth, and is a timber that deserves to be attended to with a view of bringing it into use.
Thit-phyew.

No. 20.—*Casuarina pentandra.* Scarce, but found in the Pegu district. Timber strong and close-grained.
Thabyaiywet-kya.

No. 21.—*Choolmoogra odorata.* There are a few trees of this about Rangoon, and it is also met with on the banks of streams in the Tounghoo forests, but must be considered scarce.
Taliennoe.

No. 22.—*Strychnos nux-vomica.* This is a very common tree throughout the forests. The timber is strong and close-grained, but never of very large size.
Kha-boung.

No. 23.—*Conocarpus robustus.* Very large and strong timber, growing plentifully in the Pegu, Tounghoo and Prome forests along with teak.
Baibyah.

Bwai-jin.

No. 24.—*Bauhinia parviflora*. *B. brachycarpa*. The former attains three or four feet in girth, the latter is of rather smaller size. The first is very plentiful throughout the Tounghoo and Prome forests.

Jouk-bin.

No. 25.—*Elæodendron integrifolia*. This is a very plentiful, strong, fine timber, and is found throughout the forests of the Tounghoo and Pegu districts, as well as about Rangoon.

List of red-colored woods.

The following seven sorts are strong and adapted for house-building:—

Kanazœ.

No. 26.—*Heritiera minor* and *H. litoralis*. These species are common in the Rangoon district, along the creeks and Sunderbunds. They resemble the Soondree wood so well known in Bengal for its strength and durable qualities.

1. Khway-tha-byai.
2. Thabaijeen.
3. Thabyai-tha-phan.
4. Thabyew-tha-byai.

No. 27.—1. *Eugenia pulchella*. Very plentiful in the Pegu and Tounghoo districts. 2. *E. myrtifolia*, 3. *vulgaris*, 4. *ternifolia* and *jambolana* also occur, but less plentifully than the first-mentioned species. They all afford excellent close-grained strong timber, but subject to the attack of white ants.

Cambala.

No. 28.—*Sonneratia apetala*. A strong hard wood of coarse grain, found throughout the Sunderbunds, under the parallel of Rangoon. It is the timber of which boxes for packing beer and wine are made of in Calcutta.

Kayoobin.

No. 29.—*Terminalia Chebula*. A large timber, plentiful throughout the teak forests.

Pymmah.

No. 30.—*Lagerstrœmia Pymmah*. A common and valuable timber, found generally all over the country. It ceases however a little below Tounghoo aud Prome, so that at those places it cannot be made available for building purposes; but at all the lower stations from Prome and Tounghoo downwards, it ought to supersede the use of teak.

No. 31.—*Aglaia spectabilis*. A large tree, met with along the banks of rivers in the Pegu and Tounghoo districts. It affords a light serviceable timber, somewhat stronger than the American pine, and capable of being wrought with little labour.

Thalai.

No. 32.—*Ulmis alternifolius* and *U. integrifolius*. Two of the largest trees in the province; they are found about towns and villages in the Prome district, but not below that latitude. The elms, to which family the trees in question belong, afford valuable timber.

The following seven kinds of red wood are equivalent to mahogany :—

No. 33.—*Cedrela toona.* Found on the banks of streams in the Tounghoo district, but it is scarce.
Thit-kado.

No. 34.—*Swietenia chikrassee.* Found along with teak in the Pegu district, but it is not very plentiful.
Nga-bai.

No. 35.—*Armosia dasycarpa.* This is found here and there widely scattered in the Swar and other forests north of Tounghoo.
Thitwajee.

No. 36.—*Pterocarpus dalbergioides. Padouk.* This is found chiefly as a large tree about the neighbourhood of Prome and inhabited places to the north of that town, but rarely in the forests.

No. 37.—*Careya arborea.* This is one of the most numerous trees throughout the province. The timber is large, and, together with the following, forms the chief material of which the carts of the country are made.
Baubwai.

No. 38.—One *Barringtonia acutangula* and two *B. speciosa.* The former most plentiful in the Tharawaddy district, and the latter in the Pegu forests. The wood is hard and of fine grain. It is used in constructing carts.
1. Kyai-tha.
2. Kyai-gyee.

No. 39.—*Castanea Indica.* Is a large tree, plentiful in the Rangoon, Pegu and Tounghoo districts.
Thet-khya.

The following eleven kinds of red wood are adapted to cabinet making :—

No. 40.—*Adenanthera pavonia.* Found in the Rangoon, Pegu and Tounghoo districts, but widely dispersed and not very plentiful.
Ywaigyee.

No. 41.—*Calophyllum longifolium.* This is found near towns, together with two other species of the same genus, which are of smaller growth.
Thar-rabee.

No. 42.—*Dalechampia pomifera.* This has been found on the Pymmah Choung in the Pegu valley. The trees are from three to four feet in girth.
Doukyamah.

No. 43.—*Pygium acuminata.* Scarce, but found on the banks of streams in the Tounghoo district, attaining a girth of five or six feet.

No. 44.—*Photinia serratifolia.* Found in the neighbourhood of Rangoon, and along the banks of the streams in the Rangoon district, in the direction of the teak forests.
Doukyat.

No. 45.—*Acacia stipulata.* A large heavy timber, found throughout the forests from Rangoon to Tounghoo.
Seet.

No. 46.—*Acacia Catechu.* Large and plentiful timber, found in great quantities in forests of the Prome and Tharawaddy districts, as well as on the Shan side above Tounghoo.
Shabin.

No. 47.—*Acacia Serissa.* Found throughout the province; timber large and plentiful, particularly in the Tounghoo district.
Seet.

No. 48.—*Acacia elata.* Plentiful in the Pegu, Tounghoo and Prome districts; timber straight, lengthy, and of large girth.
Seet.

No. 49.—*Ricinus diococa.* Scarce, and found only on the banks of streams in the Pegu and Tounghoo districts. Very tall, large timber.
Tawthedinbin.

No. 50.—*Antidesma paniculata.* Small crooked timber, of close grain, found in the Rangoon, Pegu, Tounghoo and Tharawaddy forests.
Byitzin.

Yellow woods.

There are three kinds fit for fancy work, viz:—

No. 51.—*Gmelina arborea.* Plentiful in the Pegu and Tounghoo forests. It is a large and remarkably strong tough timber.
Kyoonboe.

No. 52.—1. *Morinda bracteata,* and 2. *M. excerta.* Both are small trees, only found about Phoungyee houses, in a cultivated state.
1. Yaiyoe.
2. Mhan-bin.

No. 53.—*Garcinia Cowa.* Scarce, but found widely dispersed in the forests.
Toun-tha-tai.

Dark-brown woods.

No. 54.—1. *Pterospermum aceroides,* 2. *P. subacerifolium,* and *P. acerifolium.* Three species of large timber found growing along with teak in all the forests. The two first are plentiful, but the third kind is scarce.
1. Thamajamwai-zoke.
2. Najee.

This timber is extremely valuable, and is as strong as either teak or oak. Its durability for purposes of ship-building has never been tested, because it has never been desicated or killed like the teak. It attains a girth of ten or twelve feet, and rises to a lofty height.

No. 55.—*Pentaptera arjuan* and *P. glabra.* This is also a valuable timber found growing in all the teak forests; it consists of two kinds, both of equal value.
Touk-kyau.

The timber is as strong as teak, and usually attains a girth of from seven to nine feet, with height in still more lofty proportion. This timber has never, I believe, been fairly tried for ship-building.

No. 56.—*Melanorrhœa usitata.* This is the *Theet-see* or *Lignum vitæ* of Pegu. It is plentiful in the Toungboo and Prome forests, especially in the former. It is of dark red colour, of extreme closeness of grain and density of structure, with a specific gravity so great, that it serves in place of iron as anchors for native boats. Its great hardness and weight prevent its being employed in house-building. It would answer for sheaths or block-pulleys, and other purposes connected with machinery, where great strength and density are required. The tree is very common above the parallel of Toungboo, and grows to a girth of six feet.

Theet-see.

No. 57.—*Dalichampea pomifera.* Scarce, only met with on the banks of streams in the Pegu valley, particularly in the Pymmah Choung.

Doukya-mah.

No. 58.—*Butea frondosa.* Plentiful, but the timber is crooked, and only fit for ornamental work.

Pouk-pin.

No. 59.—*Mangifera attenuata.* Scarce, but found in the Pegu and Toungboo forests.

Tawsa-thayet.

No 60.—*Anacardium occidentalis.* Scarce, and only found near large towns.

No. 61.—*Zizyphus jujuba.* Scarce, only found near large towns, rarely in the Pegu and Toungboo forests.

Hyee-bin.

No. 62.—*Averrhœa Carambola.* Scarce, and only found near towns.

Zoungya.

No. 63.—*Pierardia sapida.* Plentiful in the Pegu and Toungboo forests, as well as about Rangoon.

Kanayoe.

No. 64.—1. *Ancestrolobus carnea,* and 2. *A. malis.* Plentiful in the Pegu and Toungboo forests. The timber grows very tall, but seldom exceeds three feet in girth.

1. Zoungali.
2. Yinbya.

No. 65.—*Rondeletia tinctoria.* Small timber, which, together with the last seven kinds, are adapted, from the fineness of their grain and elegance of colour, for ornamental work.

Tamayoke.

Black woods.

No. 66.—*Dalbergia.* Of this there are four kinds, all yielding a heavy timber, which will not float, similar to sissoo. These trees are very plentiful in the Tharawaddy and Hlaine districts, also in the lower parts of the Toungboo district. The timber seldom attains a very large size, and is generally found of a girth of three or four feet.

Yindike.

No. 67.—*Cassia Sumatrana.* Plentiful throughout the Hlaine, Pegu and Tounghoo forests. It is the Bombay black wood.

Mayaleo.

No. 68.—1. *Inga xylocarpa,* and 2. *I. bijemina.* Two species, affording iron-wood. This first is called Pin-ka-doe by the Burmese. It is found in all the teak forests. In the Prome forests it is usually about six feet in girth, but in all the other forests it attains a larger size, frequently eight or nine feet. It is most plentiful throughout the province. The second species is of smaller girth, but grows to a great height.

1. Pin Kadoe.
2. Tauyeu.

No. 69.—*Diospyros melanoxylon,* or Ebony. This tree is found throughout the forests, seldom however of greater girth than three or four feet. It is very plentiful.

Oukchinya.

Light-brown woods.

No. 70.—*Dipterocarpus alatus.* This timber is called in Bengal Battee Sal. It is excellent for every purpose of house-building, especially for posts. It is found chiefly to grow on laterite in the Tounghoo and Prome districts.

Aing.

No. 71.—*Dipterocarpus turbinatus.* Timber of great size and strength. It is fit for any purpose for which saul is employed, being of the same family. It is chiefly employed for canoe and boat-building. It is found in all the forest districts, except Prome, where it is scarce.

Kauyeen.

No. 72.—*Shorea robusta,* or Sal. This timber is found chiefly on the Shan side of the Tounghoo district, and in the forests north of Tounghoo.

Eing-gyeen.

No. 73.—*Melicocca trijuga.* A most valuable timber, called by the Burmese Kobin, and employed by the natives of the country for cart-wheels, oil-mills, and other purposes requiring great strength and solidity. It is found in greatest perfection on the banks of the Sitang in the Kareen forests above Tounghoo; but it is also found throughout the Pegu and Tounghoo forests in abundance, more particularly the latter. It is also found along with teak in Tharawaddy and Prome forests.

Kobin.

No. 74.—1. *Dillenia augusta,* 2. *D. scabra,* and 3. *D. speciosa.* The two first are plentiful in the forests of the Pegu district, but become scarce to the north of it, and the third species is scarce even there. They all three afford large and good timber for house-building.

1. Zinbyewn.
2. Byew.
3. Thabyew.

Thangau.

No. 75.—***Hopea odorata.*** This timber, which is said to be plentiful in the Tenasserim forests, is scarce in Pegu, and a few trees are to be found about the vicinity of Rangoon.

Thembau-kamakah.

No. 76.—***Azadaracta Indica,*** or Neem, is plentiful in the Prome district only; it is a large, but soft timber, only fit for flooring.

The above list embraces all the useful timber found in the forests of this Province, except teak. Besides timber well adapted for house-building, the list contains several promising kinds that have never yet been fairly tried for ship-building, and which in point of strength are equal to teak or oak. The timbers referred to more especially are Nos. 73, 68, 54, 55, 30 and 37, Nos. 25, 23, 19, 14 and 4 are also deserving trial for ship-building, and No. 56 for any special purposes, where great strength and density are required. Until these trials are decided, the timber employed for house-building purposes should be restricted to other kinds.

Fibrous plants.

Phetwoon.

No. 1.—*Triumfetta lobata.* This annual grows to a height of five or six feet, presents a small yellow flower in December, consisting of five petals, and in February presents a small round capsule covered with stiff bristles.

Kat-sai-nai.

No. 2.—*Urena lobata.* This is also an annual, flowering in December, but though in other respects resembling *Triumfetta,* the flower is of a light pinkish colour, and the capsules are a little larger than the last mentioned plant, and differ still more in their presenting from three to five grooves, marking the detriscence, or the number of valves or parts of which the capsule is composed; but in other respects the two plants appear alike to ordinary observation, and alike also as to the value of their fibre. They are both generally found growing together, and are two of the most plentiful weeds which are to be found in Pegu. They take possession of all ground recently cleared of tree-jungle about Rangoon, and extend without interruption to the Pegu and Tounghoo districts, but become scarce, or only occasionally met with, in the Prome and Tharawaddy districts.

Phetwoon.

No. 3.—*Corchorus olitorius.* The Bunghi of Bengal. It grows wild about Rangoon during the rainy season, and probably also in other districts, though not to the extent that *Urena* does. The plant might of course be cultivated to any extent. The fibres of the bark is the jute of Bengal.

No. 4—*Corchorus fuscus.* This is likewise an annual, which affords a strong and abundant fibre, springing up in the rainy season, and mostly found growing along with *Urena,* but not to the same extent. It affords a strong fine grey fibre.

No. 5.—*Malva cuneifolia.* This is another annual, found growing in single plants here and there all over the country, but chiefly in the jungle. It affords a strong yellowish white fibre, but from the scattered way in which it grows in a wild state, it would be difficult to collect it in any quantity.

No. 6—*Malva tiliaefolia.* Like the last, is also a straggling annual during the rains, and is found widely dispersed. The fibre of this plant resembles jute.

No. 7.—*Hibiscus violaceus.* A climbing plant found during the rainy season, affording a coarse strong fibre.

No. 8.—*Grewia floribunda.* A very common tree throughout the Rangoon, Pegu and Toungboo districts, but scarce in the Prome and Tharawaddy districts. The bark affords a coarse strong fibre, not much employed however by the Burmese.

Myat-ya.

Samples of the fibre obtained from all the foregoing plants have been sent to the "Exposition Universelle" for 1855. The plants were cut in September before flowering, and steeped, if in clear water, for twenty days, but if in stagnant or putrid water, for twelve days, when the fibrous part of the bark was easily detached. Further experiments will probably be necessary to determine the proper time for pulling the plant, as well as the best method of detaching the fibre. It is a highly promising article, both from its peculiar adaptation to the climate and soil of Pegu, and from the great demand in which fibrous plants are now held. The *Urena lobata* in particular, from its great abundance in the province, is deserving of attention, with a view to its general cultivation for fibre which may become an article of export.

No. 9.—*Æschynomene paludosa* is an annual, which springs up spontaneously in rice fields, especially in the Tharrawaddy district, and affords an excellent hemp.

Pouk.

No. 10.—*Phrynium dichotomum.* Very plentiful in the forests of the Pegu and Tounghoo districts. It is said to afford a strong fibre.

Theeu.

No. 11.—*Microlæna spectabilis.* This is one of the most numerous timber trees of the province, and yields, it is said, a fibre fit for making rope, but the Burmese do not make use of it.

No. 12.—*Bignonia coronaria,* a large tree with white flowers, very plentiful in the Tharawaddy and Pegu districts, and *Bignonia spathoidea,* found throughout the province, both afford from their inner bark material for rope employed for local purposes. The inner bark of *Sterculia ramosa* also affords a strong and durable rope in common use.

No. 13.—*Bombax pentandra, B. heterophylla* and *Cochlospermum Gossypium.* These afford a soft down, which is attached to the seeds, and which the Burmese collect for stuffing pillows.

Cotton is cultivated generally in small quantities by the Karens and other scattered inhabitants of the forests, but only for domestic use, it being for the most part spun and converted into cloth called *putso,* which is the common clothing of the Burmese.

Silk is likewise produced in small quantity by the scattered inhabitants of the forests. The silk-worm is fed on *Morus indicus,* which is cultivated in the light soil of the teak forests, that soil being very favorable to its growth.

Spices.

No. 1.—*Myristica moschata,* or nutmeg, is found growing wild in the forests between the Pegu and Tounghoo districts, in a light dry sandy soil, formed by deposit on the banks of the Cadoojway stream. It appeared to thrive, but is scarce and by no means common. The tree however is from ten to twenty feet high.

Zadaik-pho.

No. 2.—*Limonia carnosa.* The small fruit of this, not larger than a nut, is a favourite spice, known in the bazars of Bengal under the name of Keklani. It is only found in the Pegu district.

Taw-shouk.

No. 3.—*Amyris heptaphylla.* Between the Pegu and Tounghoo districts, the leaves of this tree, both dry and in a green state, are a favourite spice to the inhabitants of that part of the country, where it grows plentifully.

No. 4.—*Xanthoxylon budrunga.* A small thorny tree, the dry capsules of which are found in the bazars of India, under the name of Kek-ka-la. The seed abounds in a rich aromatic oil. The bark and large thorns of the trunk are the Tejbul of India. The tree is about twenty feet high in the Pegu and southern parts of the Tounghoo districts, where it grows upon the banks of streams.

Toung-than-gyee.

No. 5.—*Laurus nitida*, and a second species, are both small trees, about twenty feet high. Their barks aromatic, and afford an inferior kind of cinnamon. They are found in the Pegu and Tounghoo districts.

Pauna-tha.

No. 6.—*Piper betel.* This grows both in a wild and cultivated state. It is cultivated in small quantity for domestic consumption in every part of the province, except the Tharawaddy district, and grows wild in the Pegu forests, on the Cadoojway Choung.

Koon.

No. 7.—*Sinapis dichotoma*, or Mustard. This is cultivated in small quantity in the Tounghoo district.

Moung-ngyeen.

No. 8.—*Capsicum purpureum* and *C. minimum*, or Cayenne pepper. Both species are cultivated in small quantity for domestic use.

No. 9.—*Areca Catechu*, or Betel-nut. This is cultivated in small quantity for local consumption.

Koonthee.

No. 10.—*Andropogon esculentum*, or Lemon grass. It is cultivated in small quantity in every village throughout the country, and is to be had in all the bazars. It is a valuable article, and in a dry state might be found a profitable article of export.

Tsaiblain.

Gums and gum resins.

No. 1.—*Mothrus.*—*Bombax pentandra*, and *Bombax heterophylla*, are two common trees found in every part of the forests, which yield an astringent gum resin, called in the bazars of Bengal *Mothrus*. I have not been able to learn whether the Burmese extract this gum, but from the abundance of trees affording it, it might become an article of some importance.

Let-pan.

No. 2.—*Kotheela.* Six species of *Sterculia*, four of which, *viz. Sterculia ramosa*, *S. fœtida*, *S. campanulata*, *S. piperifolia*, are very plentiful throughout the province, and yield a gum which is known in the bazars of Bengal under the name of Kotheela. The other two species, *Sterculia balangas* and *S. colorata*, are not so plentiful. This gum is probably analogous to *Tragacanth*, which Dr. Lindley states, is obtained from a species of *Sterculia* at Sierra Leonne.

Tshaw.

No. 3.—*Hing*, a gum which is well known under that name in the bazars of Bengal, is procurable from two species of *Gardenia*, which yields it in Bengal, and which are very common throughout the Pegu, Rangoon and Tounghoo districts.

Thunghsheen-pan.

No. 4.—*Gamboge. Xanthochymus ovalifolius,* which, according to Wight and Arnot, is the only plant in Ceylon that yields gamboge fit for the arts, is found in the Rangoon, Pegu and Toungboo districts, but it is rather scarce. *X. pictorius,* which is very plentiful, also yields gamboge, but probably of a less valuable description, as also *Garcinia Cowa* or wild mangosteen tree, which is likewise common.

No. 5.—*Galbanum.* The plant affording this article is not well known, but Dr. Ainslie, as quoted by Dr. Royle, states its Hindustani name to be *Kinneh-ke-gond,* and the latter author observes that a gum resin, known in India under the name of *Kinni-ke-gond,* is afforded by an exudation from the bark of *Odina Wodier.* Now this tree constitutes probably a larger proportion of the forest both in the Prome and Tharrawaddy districts than any other, and if found to afford *Galbanum,* might be rendered an important addition to the resources of the Province.

No. 6.—*Gum-kino.* The Gum-kino from India is supposed to be obtained from *Pterocarpus marsupium.* But as the articles sold as *kino* are produced from trees of four different families of plants, and come from many opposite parts of the world, it is probable that the properties on which their value depends are of a general nature, and therefore that *P. dalbergioides,* equally with *P. marsupium,* affords the Gum-kino of India, and this opinion is also entertained by others. *P. dalbergioides* is found in the northern parts of the province in the Prome district, chiefly in the vicinity of towns and inhabited places, rarely in the forests.

No. 7.—*Butea.* This gum, which is one of the most valuable articles of the class to which it belongs, yielded from incisions in the bark of *Butea frondosa,* a tree of very general occurrence throughout the province, bu more especially about Tounghoo, where it cannot escape notice from its bright orange flowers, which illuminate the forest in all that part of the country during the months of February and March. It appears to be one of the most useful kinds of gum, and might be supplied to any extent from this province.

Pouk-pin.

No 8.—*Dammer.* This article is found in the bazars throughout Pegu. It is yielded by the *Shorea robusta* or the sal tree of India, which occurs plentifully in the forests on the Shan side of the Sitang, east of Tounghoo, and also, but to less extent, in the forests of the Prome dsstrict. I have not found however that the dammer is obtained from these forests, as none of the trees appear to have been perforated for it, so that the supplies of this article are probably brought down to Pegu from forests beyond the frontier.

Pwai-ngyet.

Sha-see.

No. 9.—*Catechu*. Next to timber, *Catechu* or *Cutch* is undoubtedly one of the most important exports of the province, and Pegu Cutch has obtained a reputation, which will always give it a preference in the market. *Acacia Catechu*, the tree from which it is procured, begins to appear about six miles to the north of Rangoon, and from thence it increases both in the number and size of the trees until it constitutes the prevailing character of the forests to the north-east of Prome, where the trees are fifty to sixty feet high with a girth of seven or eight feet, and it is said to attain even a larger size in the Burmese territories lying north of the boundary. It is found plentifully in the northern part of the Tharawaddy district, but it is scarcely to be seen on the Tounghoo side of the hills. Thus it is entirely confined to the valley of the Irrawaddy. The manufacture of Cutch is scarcely known or practised below Meeaday, and that which finds its way into the market, as Pegu Cutch, probably comes chiefly from beyond the frontier. There is no reason why it should not be manufactured largely from the parallel of Henzadah upwards, as the tree from thence becomes inexhaustible, growing over rich rice plains in places of easy access.

Oils and oil seeds.

Kanyinsee.

No. 1.—*Wood Oil*. This is afforded by, and largely extracted from *Dipterocarpus turbinatus*, one of the largest trees known. It is found throughout the southern as well as all the Sitang forests, disappearing curiously enough whenever the *Acacia Catechu* appears. Thus where the latter is in perfection, in the northern part of Tharawaddy, and Prome districts, the wood-oil tree is rarely seen, and where the latter is found in perfection, as in the southern forests, and throughout the forests of Tounghoo, west of the Sitang, there is no *Acacia Catechu*. The wood-oil tree grows in light sandy soil, near the banks of streams, and in dense forests, frequently attaining 18 feet in girth, with a proportionate height. The oil is extracted by cutting a large notch in the tree, a few feet from the ground, and occasionally stimulating the secretion by scorching the surface of the scar, which is generally converted into charcoal, and gives the oil a dirty black appearance.

Sweet or fatty oils.

Gwai-douk.

No. 2.—*Cannarus speciosa*. A large tree, very plentiful throughout the Rangoon, Pegu and Tounghoo districts, where it is known under the name of ***Kadon-kadet***, remarkable for the quantity of its seeds, which are of large size, abounding in sweet oil.

No. 3.—*Cannarus nitida,* a shrub about ten feet high, is likewise very plentiful, especially in the Rangoon district, and affords an oil-seed of smaller size, but especially rich in a similar sweet oil.

No. 4 —*Galepupha arborea* and *G. tetrapetala.* Both of these yield an oil expressed from the seed, called in Bengal *Karunga-ka-let,* which is used for burning, as well as medicinally for external use as an embrocation. They are both very common trees, more especially in the Prome district. The seed is large and might be collected in any quantity.

No. 5.—*Buchanania latifolia* and *B. augustifolia.* The former is plentiful, both in the Pegu and Toungboo districts, and the latter is only seen about Rangoon. They both yield valuable oil-seeds of the sweet or fatty class.

That-sai.

No. 6.—*Anacardium occidentale.* This tree, although scarce in the forests, is largely cultivated about Phoungyee houses and in groves near towns. It yields the *Cashew nut oil* of the Madras list.

Theo-ho-thayet.

Aromatic or essential oils.

No. 7 —*Xanthoxylon badrunga.* This plant, which is found in the Pegu and Southern parts of the Toungboo districts, affords a plentiful supply of oil-seeds, which has not as yet, I believe, been taken advantage of as it deserves.

Young-thaujee

No. 8.—*Calophylum longifolium,* which, from its size, might be reckoned among the timber trees of the province, affords an oil-seed, which would yield an oil probably similar to that of *C. inophyllum,* which is known in Madras as *Pinnacotax oil (vide* list of oil-seeds circulated for information by the Madras Government, November, 1854.) This tree, together with *C. inophyllum* and *C. lanceolaria* is cultivated for the fragrance of its flowers. The seeds are large and contain a considerable proportion of oily matter, which possesses much of the aroma of the flower.

Thar-rabee.

No. 9.—*Spondias mangifera.* This tree, which is cultivated generally by the Burmese in groves near large towns, yields the *Saurapuppo nut oil* of the Madras list. The tree grows to a considerable size, and yields abundant seed.

No. 10.—*Michelia Champaca.* This is also a large tree, cultivated greatly by the Burmese for the fragrance of its yellow flowers. It is from this that the *Sumpunghee oil* of the Madras list is obtained.

Sagga.

No. 11.—***Aucklandia costus.*** An annual of general occurrence about Rangoon and every part of that district. It affords the *Patchakoo oil* of the Madras list.

The list of oil seeds might be extended, but I have confined it to those articles only which could be supplied in bulk, more advantageously from Pegu than any other source.

Dyes.

Hsoo.

No. 1.—*Carthamus tinctoria*, or Safflower. This is cultivated to a small extent for its flowers, which yield a yellow dye. The dry flowers are found in the bazars of India and Bengal, in the latter under the name of *Kusum*. It is used by the Burmese for dyeing cotton, and might be much more largely cultivated, as the climate seems favourable to its growth.

No. 2.—*Grislea tomentosa*. The red flowers of this plant are used for red dye. In the bazars of Bengal they are found in a dry state, under the name of Datoke. The plant is very common in the Prome district, and flowers in April. It is not found in the Tounghoo district.

Ponk.

No. 3.—*Butea frondosa* and *B. superba*. The flowers of these plants may be had in greater quantity in Pegu than any part of the east. They are called in the Bengal bazars *Palas-phool*, and afford a bright yellow colour. The Burmese are fully acquainted with the value of this dye, and the article is found in all the bazars.

No. 4.—*Galedupha tetrapetala*. The flowers of this yield a fine red dye.

Ywaigyee.

No. 5.—*Adenanthera pavonia*, or red Sandal-wood. Scarce, but found in sufficient quantity in the Rangoon, Pegu and Tounghoo districts. It is called *Rukta Chundun* in the bazars of Upper India, a name which Dr. Royle observes is also given to the wood of *Pterocarpus santalinus*.

Yaiyoe.

No. 6.—*Morinda bracteata*. This wood, of bright yellow colour, is found in the Bengal bazars under the name of *Rouch*, and is valuable as affording a bright yellow dye. The tree is common throughout the Province. It is also cultivated about Phoungyee houses.

No. 7.—*Photinia serratifolia*. The leaves of this plant are used for a green dye.

Tainyet.

No. 8.—*Cæsalpinia Sappan*. Sappan-wood or *Bukkum* of the bazars of Upper India. It is found in the immediate vicinity of Prome, growing in the small hills of that place, but except near Thoungzai, in the northern part of the Rangoon district, where it is also seen in small quantity, I have not found it in the interior of the province or in the larger forests, so that it is perhaps scarcely entitled to a place amongst the natural productions of Pegu.

No. 9.—*Bixa Orellana*, or *Arnotta*. This is cultivated all over Pegu for the red and yellow dyeing properties of its capsule. This is found in all the bazars, and in those of Bengal under the name of *Lat-kan*. It is a favorite dye with the Burmese, and might become a production of some importance.

Thee-dew.

There are several other plants, as *Wrightea tinctoria*, &c., which have the reputation of affording dyes, but I have confined my remarks to such as are of known value and in use with the Burmese.

Plants cultivated for their Fruit.

No. 1.—*Anona squamosa*, or Custard Apple. This fruit was cultivated in the Burmese time to great extent, and with much success, on the slope of the hills about Prome on both sides of the river. Since our occupation of the country, the plantations have fallen into neglect, and although supplies of the fruit are still furnished, yet these are so to a much more limited extent, and as the plants now receive no care, the fruit will soon become scarce. This and similar sub-acid fruits form a considerable article of food to the Burmese, to whom they serve as a substitute for fresh-meat, being eaten with rice as an ordinary article of their daily provisions.

Ame-sa.

No. 2.—*Carica papaya* is generally found in villages throughout the country, and grows without much care. The fruit is generally gathered in a green state, and dressed as curry, which with rice, forms a very common repast.

Thin-baw.

No. 3.—*Ægle marmelos* and *Feronia elephanta*. The former the large, and the latter the small wood-apple, are likewise found about towns and villages throughout the Prome district, and also about Tounghoo, more especially on the Shan side of the river, where they may be had in great quantity from the end of February to the month of July. These fruits are now in very general use in hospitals, being found to promote the regular action of the bowels in cases of dysentery and diarrhœa; I may mention, lest their resemblance to the fruit of *Nux-vomica* might give rise to accidents, that the strong aromatic smell of the wood-apples, like that of all other fruit of the orange family, to which they belong, is the best test by

Ouk-sheet.

which they may be known from the *Nux-vomica* fruit, which is devoid of aroma.

No. 4.—*Mangoe*. This fruit is very plentiful throughout Pegu, but more especially in the Tharawaddy and Toungoo districts.

Thayet.

No. 5.—*Averrhœa carambola* is grown about Rangoon and many places in the interior for its acid fruit, which is employed, like the unripe *Papaya*, and many other green sour fruits, in curry, and highly prized as a wholesome dish by the Burmese.

Zoung-yah.

No. 6.—*Artocarpus integrifolius*, the Jack, *A. chaplasha*, the lesser or thorny Jack, and *A. lakoocha*, the small Jack. All three varieties are prized by the Burmese as an article of food, especially the first, which grows to great perfection every where throughout the province with little care.

Pain-nai.

No. 7.—*Tamarindus Indica*. The Tamarind-tree is so common about almost every town and village in Pegu, that it would appear to be indigenous to the country, yet it is never seen in the jungles, so that it was no doubt introduced originally and cultivated for its fruits and leaves, both of which are in great request. The fruit is found in every bazar in a dry state, the leaves are eaten as vegetables, generally added to curry.

Majee.

No. 8.—*Durio zibethinus*, or Dorian. This fruit can scarcely be said to belong to Pegu, although there are a few trees about Rangoon which bear fruit, yet the King of Burmah has always obtained the supplies for the royal table from Moulmain.

Doowin.

No. 9.—*Sweet limes* are grown in some parts of Pegu to a very small extent, but as this and two other kinds of wild lime are indigenous to the forests in the northern parts of the province, it is probable that oranges might be cultivated with success about Prome, and from thence to Meeaday.

Shouk-cho.

The same observation applies to the grape, of which several sorts of wild vine are found in the upper part of the province, so as to render the trial of the grape vine very desirable.

No. 10.—*Plantain*. Although perhaps there is no province in India, in which plantains are grown to so great an extent as in Pegu, yet there are scarcely any good plantains to be had in the country. This is owing to the Burmese habit of only eating green fruit, and their total indifference to the finer qualities of flavor. The great use of all fruit with the Burmese is to serve as an addition

Ng-hyet-praw.

to their curry, for which purpose one kind of plantain is just as good as another. But now that a market is opened for the better description of this and other kinds of fruit, the introduction of a good stock becomes desirable.

N. 11.—*Pine Apples.* These are perhaps the best of all the cultivated fruits of Pegu, and they require so little care, that they are brought into market in Rangoon in vast quantities of the finest quality from the end of April until the middle of August. In the upper parts of the province, about Prome and Tounghoo, they are scarce.

Nanat.

Wild Fruits.

These are more numerous than the cultivated fruits, and may be considered under two heads, namely, green fruits, employed rather as esculent vegetables, and sub-acid fruits. Of the first, the fruit of the

	Dillenia speciosa.
	Xanthochymus pictorius.
Theet-foe.	*Sandoricum indicum.*
Ny-an-gyee.	*Randia oliginosa.*
Yan-sa.	*Mangifera attenuata.*
Wambala.	*Soneratia apetala.*
Kyain. Than.	*Ficus macrophylla, F. glomerata, F. lanceolaria,*
Oung.	*Calamus, Borassus, Cocus,*

are used as an addition to curries.

The sub-acid wild fruits, eaten only in their ripe state, are the berry of *Flacourtia cataphracta,* with much of the appearance and flavor of a plum.

Pierardia Sapota, which resembles the *loquat,* but which grows in bunches like the *leechee.* It is equal to either of those fruits, and might be greatly improved no doubt by cultivation. It is very plentiful in the Rangoon market from the end of April to the middle of May.

Kanua-kuzza.

Toun-thalai.	*Garcinia Cowa,* or wild mangosteen.
	Spondias acuminata, or long plum.
Kwai.	*Spondias mangifera,* the fruit is said to be pleasant, with a flavor like the mangoe.
Hzee.	*Zizyphus jujuba.*
Tan-thayet.	*Mangifera oppositifolia,* or wild mangoe.
	Syzigium balsamicum, a purple berry, with a pleasant flavor.

Malaka.	*Psidium pomiferum*, a large yellow berry.
Hzee-phoo.	*Phyllanthus emblica*, a large green berry, found in a dry state in the bazars.
Kyet-tha-hen.	*Antidesma paniculata*, small sour plum.

To which may be added the albuminous seeds of *Morinda bracteata*, the bean of *Inga doneean*, the acorn of *Castanea indica*, and the seed of the *Jack*, which, when roasted, are articles of food; while an infusion of the fruit of *Elaeodendron orientale* is drunk by the Burmese as tea.

Plants cultivated for Food, Oil, &c. in Pegu.

Esculent Vegetables.

Khayan.	*Solanum melongena*, brinjal.
Thavan myai bone.	*Solanum lycopersica*, tomato or love apple
	Amaranthus polygamus, green Bajee, for vegetable curry.
	Amaranthus atropurpureus. purple ditto.
Penzeing.	*Ocymum vilosum*, mint for ditto.
Chin-boung.	*Hibiscus sabdariffa*, red sorrel or roselle for curry
Kazoon-o-u.	*Hibiscus longifolius*, another variety for ditto.
Myouk nee.	*Batatas edulis*, sweet potato.
	Dioscorea purpurea, purple yam.
	Dioscorea glabra, the smooth ditto.
	Dioscorea rubella, the red ditto.
	Jatropha manihot, the Cassava yam.
	Hedysarum tuberosum, the Batraj ditto.
Myai-bai.	*Arachis hypogea*, the earth-nut.
	Dolichos catjang, long or French bean.
	Dolichos lablab, the Indian ditto.
Mouc-lah.	*Raphanus sativa*, or radish.
Pailiu-moay.	*Trichosanthes anguina*, the snake gourd.
Kyet-bin-ga.	*Momordica charantia*, or small ditto.
Tha-boot.	*Luffa pentandra*, the five-cornered ditto.
Tha-boot-khawai.	*Luffa decandra*, the ten-cornered ditto.
Boo-shin-sway.	*Lageneria vulgaris*, the cuddoo or bottle ditto.
	Lageneria pipo, the pumpkin.
	Lageneria melo-pipo, or squash.
	Arum furfuraceum, scaly yam.

Tha-khwa-gyee.	*Cucumis usitata*, large cucumber.
Tha-khwa.	*Cucumis sativus*, common ditto.
Hpayai.	*Cucumis citrullis*, or water-melon.
Kyet-thoon.	*Allium cepa*, the onion.
Gua-yoke.	*Capsicum purpureum*, red pepper.
	Capsicum minimum, small bird's-eye pepper.
	Andropogon esculentum, or lemon grass.
Baing.	*Cannabis sativa*, or bang.
Hsai.	*Nicotiana*, tobacco.
Koon.	*Piper betel.*

Oil Seeds.

Moung-ngyeen.	*Sinapis dichotoma.*
Huan.	*Sesamum muralis.*

Grains and Pulses.

Pai.	*Phaseolus mungo*, green gram.
	Eleusine corocana.
Pyoun-boo	*Zea mays*, or Indian corn.
Htson.	*Oriza sativa*, or rice of numerous kinds.

The Burmese method of cultivation is as simple and rude as the objects of it are confined. Rice is the only thing cultivated to any extent, the other articles enumerated in the above list, with few exceptions, are only procurable during the rainy season; at other seasons, the young leaves, flowers, and fruits of almost every plant, that is not poisonous, supply the place of vegetables in their curries.

The cultivation of rice begins in the early part of June, after the first heavy fall of rain in low ground, thoroughly saturated and partially under water. A pair of buffaloes are then yoked to a gigantic rake, having strong wooden prongs about a foot long inserted at about nine inches apart, upon which the driver stands to give additional weight to the rake, and to cause the prongs to sink deeper into the soft ground, while he guides the buffaloes, thus traversing the field in every direction, after which, when the surface is thoroughly broken, the seed is sown broad cast. About a month after, when the young crop has risen above the water, it is partly taken up and transplanted in higher ground, previously prepared in the same manner. This is the manner in which all the great rice cultivation of the country is performed. But in high districts, which are never under water, another method is practised by the Hill people, and which, from its effects upon the forest, deserves to be noticed.

The cultivation alluded to is known in these provinces (for it is not peculiar to Pegu) as Toungyas, which probably signifies that the same ground cannot be cultivated twice in the same generation. A portion of the forest is cleared to the extent of forty or fifty acres, sometimes much more. The timber being felled indiscriminately in the early part of the dry season, lies exposed to a scorching sun until the approach of the succeeding rains, when it is set fire to, producing a conflagration which is not confined to the Toungyas, but spreads over the dry, and, at this season, parched forests, reducing the finest timber to ashes. The ground being thus cleared, and the soil at the same time enriched with ashes, all that is necessary is to await the first fall of rain, and then to sow the rice on the burnt surface without any further preparation. It requires no transplanting or further care, but the same land will not afford another crop, so that the same process must be repeated every year in a new place. Cotton is grown only in these Toungyas, and that very partially; it is sown with the rice, the latter ripening in October is removed, and the cotton allowed to hold possession of the ground, until it ripens its capsules in March; a few cotton plants, sprung up spontaneously in the same ground from the seed of the previous season yielding a second year's poor crop. Beyond this the Toungya becomes waste, and several generations pass away before it yields another crop.

This method of cultivation by Toungya is hereditary with the Karens, who know no other. But as they occupy remote forests difficult of access, where timber is useless, and land of no value, the inconvenience arising from it is not likely to be felt. The practice, however, more especially in the Prome district, is not confined to the Karens or even to hills, but is adopted by the Burman population to a certain extent in the plain bordering the hills, and in some cases is carried into the plains, where there is no want of good rice ground, as on the north-east side of Pounday.

The observation of Major Phayre has been directed to this subject, and whatever can be consistently done to check a practice so wasteful and destructive as regards teak forests will be accomplished. The whole of the lower teak forests throughout the Prome district have been materially injured by Toungya cultivation, and some of them more or less destroyed.—*From the Records of the Government of India.* No. IX.

The Chinese white wax.

LINNÆAN, *May* 1st.—The President in the Chair. A memoir "On the White Secretion of *Flata limbata* and its relation to the White Wax of China," by Dr. Murchison, communicated by Dr. Hooker, was read. In April, 1854, Dr. Murchison observed the leaves of certain trees and shrubs growing in the jungles in the neighbourhood of Rangoon to have a singular whitened appearance, which proved to be caused by numbers of insects bearing long white pectinated appendages of considerable length. On the slightest motion being communicated to the leaves, these insects sprung off in all directions, leaving, however, the white appendages behind. Dr. Murchison left Burmah without further opportunity of collecting and examining the insects, which appeared to be a little larger than a common house fly. The appendages which remained on the leaves after the flight of the insects were found to be adhering to a number of dried insect cases, each furnished with six legs, and evidently the remains of a former stage of the insect's existence. On examination it was found that this white matter coating the leaves possessed the properties of the insect wax of China. Acting on this suggestion, Dr. Murchison instituted a series of observations, which led to the conclusion that the insect he had found, though probably not the same which yields the insect wax that has been imported from China, is yet one which, by some authors, has been described and figured as the true Chinese wax insect; and moreover, it was ascertained that it does yield, in considerable quantities, a substance of a waxy nature, which it seems probably may be employed for economic purposes. It would appear that one of the first notices in any English work of the Chinese wax insect, is by Sir G. Staunton, in his account of Lord Macartney's embassy to China; and Sir G. Staunton's insect, the description of which coincides exactly with that found at Rangoon, is stated by Mr. Westwood (*Gard Chron.*, July, 1853,) to be the larva or pupa of the *Flata limbata* of Fabricius. In the Reports of the Juries of the Exhibition of 1851, the Chinese insect wax is stated to be the produce of the male *Coccus ceriferus*; but this insect has been shown by Dr. Anderson to yield the substance called white lac in Madras, which presents properties very different from the Chinese wax, being soluble in alcohol and ether, and of higher specific gravity than water. Mr. D. Hanbury has subsequently endeavoured to prove that the Chinese insect wax is the production of a species of *Coccus*, and not of the *Flata limbata*, his conclusions being drawn from specimens of the crude wax transmitted from Shaughai, as being employed for obtaining the wax of commerce. In this sample was a number of full-grown bodies of a female *Coccus*, as well as pieces of stick encrusted with wax, and with the insects still in *situ*. The insect Mr. Westwood had named *Coccus sinensis*, and subsequently *(Gard. Chron.*, 1853,*) Coccus Pela*. There is every probability that the *Coccus Pela* contributes at least, to the formation of the wax of commerce; but Dr. Murchison suggests that not improbably the wax from different parts of China may come from different insects. The Chinese wax of commerce is insoluble in water, and but very sparingly soluble in either alcohol or sulphuric ether, and it does not saponify with an alkali; its specific gravity is .965, and its melting point has been variously estimated at from 181. to 196° F.; the melting point of common pure white wax being 155°, and its specific gravity ·963. The wax of the *Coccus Pela*, purified, was found by Mr. Hanbury to have its melting point at 182. ·75 F,; its specific gravity has not been ascertained; it does not dissolve, or at least very sparingly, in alcohol, ether, or in solution of caustic alkali; but it dissolves readily, like the Chinese wax of commerce, in naphtha and fixed vegetable oils; and on cooling after melting, indicates the same acicular crystalline structure. The characters of the white secretion of the *Flata limbata* coincided very closely with that of the substances just noticed; it had the same kind of acicular crystallisation in stellate masses; the melting point was not very accurately made out, owing to the minute quantity operated on, but it appeared to be beween 190° and 200° Fahr.; it was insoluble in water, in which it floats, and but sparingly if at all soluble in alcohol, sulphuric ether, or solution of caustic potash, whilst in naphtha and vegetable oils it dissolves readily. From these characters there can be little doubt that the white secretion of the *Flata limbata* is of the nature of wax, and moreover that this waxy matter is very similar in its properties to the Chinese insect wax of commerce. It further appears probable that the *Flata* is a source of that substance. That it is not the only source seems proved by the facts adduced by Mr. Hanbury in favour of the *Coccus Pela*. Considering, indeed, that the annual produce of the insect wax is not far short of 400,000 lbs. per annum, and considering the very small quantity yielded by an individual insect, Dr. Murchison thinks it not improbable that the substance is derived from several species of insect, of which no doubt the *Coccus Pela* is one, and the *Flata limbata* another.—*Gardener's Chronicle*, 19*th May*, 1855.

Chinese Silk worm.

It is announced by M. Guérin Méneville that the cold country silkworm of China has at last been reared in France. It has long been known that in the land of the Mantchour Tartars, in a climâte at least as rigorous as our own, a kind of silk is obtained, of which very large quantities go into consumption among the Chinese. The clothes of "millions" are said to be prepared from it.

Some years since Mr. Rutherford Alcock, Her Majesty's Consul at Shanghae, sent home samples of this material, both manufactured and unmanufactured, along with live chrysalids (cocoons), but the latter perished on the voyage, and the samples were accidentally misplaced and lost in the Great Exhibition of 1851. The silk was strong, with little lustre, and resembled some strong thin yellow woollen linen. It now appears that the French have been more successful, some males having already been hatched. Of the other cocoons sent to Italy and Algiers, no account is given.

According to Guérin Méneville, this silkworm forms a new species of night-flying *Bombyx*, of the section *Saturnia*, and is nearly related to the *Bombyx myllita*, which produces the Tussah silk of India. But the peculiarities observable in the form, texture, and mode of attachment of the cocoons, forbid the Mantchour moth being regarded as merely a northern local form of the Tussah silkworm. It is also one of the same Lepidopterous group as the Mooza silkworm of Assam, whose silk is largely employed in India, and which was described by the late Dr. Helfer under the name of *Bombyx Assamensis.*

Two circumstances give peculiar interest to the introduction of this useful insect; namely the coldness of the country it naturally inhabits, and its feeding upon a species of oak, not on a mulberry. The country called Mantchooria is described as mountainous, very cold in winter, and producing *furs* among other articles of trade. Oaks, pines, willows, birches, maples, and wild roses, said to constitute the main features of its woods, are all indications of a northern climate. The oak on which the silkworm of this remote region feeds is not clearly described. According to Mons. Isidore St. Hilaire, two sorts have been raised in France from the acorns received with the cocoons, one resembling the *Quercus castaneæfolia,* which is well known to be a native of northern China; and one of a species apparently undescribed. But it is by no means improbable that the common oaks of this country would be taken to by the silkworms in question, and if so, the sole obstacle to the introduction of silk-growing among our rural population would be removed; and a better means than now exists of employing the women and children of the peasantry would be at once afforded.

It is right to add, upon the authority of Mons. St. Hilaire, that the interesting acquisition in question is mainly owing to the assistance given by Monseigneur Verrolles, Bishop of Colomby, and Vicar-Apostolic in Mantchooria, to M. de Montigny, the French Consul at Shanghai. Let us hope that some of our own people will tread with equal success in the enlightened and patriotic steps of these gentlemen.—*Gardener's Chronicle, 30th June,* 1855.

Scented Tea.

(*Extracted from a Communication to the Athenæum, by* Mr. Fortune.)

"I have been making inquiries for some time past about the curious process of scenting teas for the foreign markets; but the answers I received to my questions were so unsatisfactory, that I gave up all hopes of understanding the business until I had an opportunity of seeing and judging for myself. During a late visit to Canton I was informed the process might be seen in full operation in a tea factory on the Island of Honan. Messrs. Walkinshaw and Thorburn, two gentlemen well acquainted with the various kinds of teas sent annually to Europe and America, consented to accompany me to this factory, and we took with us the Chinese merchant to whom the place belonged.

"In a corner of the building there lay a large heap of orange flowers, which filled the air with the most delicious perfume. A man was engaged in sifting them, to get out the stamens and other smaller portions of the flower. This process was necessary, in order that the flowers might be readily sifted out of the tea after the scenting had been accomplished. The orange flowers being fully expanded, the large petals were easily separated from the stamens and smaller ones. In 100 parts, 70 per cent. were used, and 30 thrown away. When the orange is used, its flowers must be fully expanded, in order to bring out the scent; but flowers of jasmine may be used in the bud, as they will expand and emit their fragrance during the time they are mixed with the tea. When the flowers had been sifted over in the manner described, they were ready for use. In the meantime the tea to be scented had been carefully manipulated, and appeared perfectly dried and finished. At this stage of the process it is worthy of observing, that while the tea was perfectly dry, the orange flowers were just as they had been gathered from the trees. Large quantities of the tea were now mixed up with the flowers, in the proportion of 40 lbs. of flowers to 100 lbs. of tea. This dry tea and the undried flowers were allowed to lie mixed together for the space of 24 hours. At the end of this time the flowers were sifted out of the tea, and by the repeated sifting and winnowing processes which the tea had afterwards to undergo, they were nearly all got rid of. Sometimes a few stray ones are left in the tea, and may be detected even after it arrives in England. A small portion of tea adheres to the moist flowers when they are sifted out, and this is generally given away to the poor, who pick it out with the hand.

"The flowers, at this part of the process, had impregnated the tea leaves with a large portion of their peculiar odours, but they had also left behind them a certain portion of moisture, which it was necessary to expel. This was done by placing the tea once more over slow charcoal fires in baskets and sieves prepared for the purpose of drying. The scent communicated by the flowers is very slight for some time, but like the fragrance peculiar to the tea-leaf itself, comes out after being packed for a week or two. Sometimes this scenting process is repeated when the odour is not considered sufficiently strong; and the head man in the factory informed me he sometimes scented twice with orange flowers, and once with the 'Mo-le' *(Jasminum Sambac)*.

"The flowers of various plants are used in scenting by the Chinese, some of which are considered better than others and some can be had at seasons when others are not procurable. I considered it of some importance to the elucidation of this subject, to find out not only the Chinese names of these various plants, but also by examining the plants themselves, to be able to give each the name by which it is known to scientific men in all parts of the world. The following list was prepared with great care, and may be fully relied upon. The numbers prefixed express the relative value of each kind in the eyes of the Chinese, and the asterisks point out those which are mostly used for scenting teas for the foreign markets:—

1. Rose-scented (Tsing moi-qui hwa).
1 or 2. Plum, double (Moi hwa).
2*. Jasminum Sambac (Mo-le hwa).

2 or 3*. Jasminum paniculatum (Sieu-hing-hwa).
4*. Aglaia odorata (Lan-hwa, or Yu-chu-lan).
5. Olea fragrans (Kwei hwa).
6*. Orange (Chang hwa).
7*, Gardenia florida (Pak-sema hwa).

"It has been frequently stated that the Chloranthus is largely used. This appears to be a mistake, originating, no doubt, in the similarity of its Chinese name to that of *Aglaia odorata* The Chloranthus is called 'Chu-lan'; the *Aglaia* 'Lan' or 'Yu-chu-lan'. Yet we can positively assert that the peculiar fruit of Chloranthus, as well as its flowers, occurs in some scented tea.]

"The different flowers which I have just named are not all used in the same proportions. Thus, of orange flowers there are 40 lbs. to 100 lbs. of Tea; of *Aglaia* there are 100 lbs. to 100 lbs., and of *Jasminum Sambac* there are 50 lbs. to 100 lbs. The flowers of the 'Sieu-hing' *(Jasminum paniculatum)*, are generally mixed with those of the 'Mo-le' *(Jasminum Sambac)*, in the proportion of 10 lbs. of the former to 30 lbs. of the latter, and the 40 lbs. thus produced are sufficient for 100 lbs. of tea. The 'Kwei hwa' *(Olea fragrans)* is used chiefly in the northern districts as a scent for a rare and expensive kind of Hyson Pekoe—a tea which forms a most delicious and refreshing beverage when taken *à la Chinoise*, without sugar and milk. The quantity of flowers used seemed to me to be very large; and I made particular inquiries as to whether the teas that are scented were mixed up with large quantities of unscented kinds. The Chinese unhesitatingly affirmed that such was not the case, but notwithstanding their assertions, I confess I have some doubt on this point.

"The length of time which teas thus scented retain their scent is most remarkable. It varies however, with the different sorts. Thus the *Olea fragrans* tea will only keep well for one year; at the end of two years it has either become scentless, or has a peculiar oily odour, which is disagreeable. Teas scented with orange blossoms and with those of the 'Mo le' will keep well for two or three years, and the Sieu-hing kinds for three or four years. The *Aglaia* retains the scent longer than any, and is said to preserve well for five or six years. The tea scented with the Sieu-hing is said to be most esteemed by foreigners, although it is put down as second or third-rate by the Chinese.

"It appears from these investigations that many kinds of fragrant flowers, besides those used by the Chinese, would answer the purpose equally well, and therefore in places like India, where tea is likely to be produced upon an extensive scale, experiments in scenting might be made with any kinds of jasmines, daphnes, aurantiaceous, or other fragrant plants indigenous to the country.—*Gardener's Chronicle, 4th August*, 1855.

MR. NATHANIEL WILSON *on the useful Vegetable Products, especially the Fibres of* JAMAICA.

We have heard rumours, but we trust they are without foundation, of the want of Government support to the Botanic Garden in Jamaica; and that Mr. N. Wilson, its active and very intelligent Superintendent, has left, or is on the point of leaving, the colony altogether. We have ourselves had occasion, in the great Paris Exhibition of the present year, to witness the necessity of some scientific knowledge, in the accurate determination of the plants which yield the various vegetable substances. The Jamaica collection there deposited, valuable as it is in extent, becomes tenfold more important from the *correct* nomenclature of the objects. To say nothing of the noble collections and fine specimens of the woods, etc., it contains a series of fibres of the island which is more instructive than any other in the Exhibition, because of the great pains that have been taken by Mr. Wilson to give the scientific and vernacular names, rendering it quite clear what is the exact plant which produces such and such fibre; while in other collections we find *one* and the *same* name (*Pine-apple, Aloe, Manilla Hemp*, etc.,) attached to fibres from totally different (and to several kinds of) plants. "Si-nomina pereunt, perit et cognitio rerum.' Such names are worse than useless—they mislead. We believe the latest duties performed by Mr. Wilson in the island were to draw up a Report on the progress and usefulness of the Botanic Garden of Bath, St. Thomas the Apostle, for the past year, 1854, for the information of the Honourable the Board of Directors, and to prepare a full series of the Fibres, etc. for the Paris Exhibition. As these fibres are described in the said Report, we are tempted to offer the following extracts.—ED.

By a continuous and extensive distribution of plants from this Institution of late years, this Botanic Garden has from a comparative state of obscurity been brought into one of practical utility and national importance, evidenced by the dissemination of thousands of plants, both useful and interesting, where such were never seen or heard of before. Consequently the limits of this garden have rendered it totally inadequate to meet the exigency of the present demand, or to do anything like justice to the constantly-accumulating collection of plants, being only one and three-quarter acres in extent. The new plants have therefore to be disposed without plan or arrangement, wherever a few feet of spare ground can be found, and consequently they suffer much for want of space. You are aware of this circumstance, as I have mentioned it in my last Report. My object in again bringing the subject to your notice is that you may, in conjunction with your general Report on the state of the Institution, lay before the Executive the circumscribed state and difficulties under which the Botanic Garden is now suffering; in order that no time may be lost in remodelling, if possible, and placing the interests of the Garden on an extensive, permanent, and useful basis, adequate to meet the increasing wants of the community, and to do justice to a popular, useful, and highly increasing science.

The Cappan and Cam dye-woods, Nutmeg and Cinnamon plants, have been distributed to all parts of the island, and I have still a few on hand. As to their perfect suitability to this climate and soil none need entertain the slightest doubt. The distribution of plants in general have amounted to 1720, all of which were fully established in baskets. so that no loss could possibly take place but by wilful neglect.

The desire for growing new plants and adopting new staples is daily on the increase, and the necessity of a more varied cultivation among our agriculturists has become indispensable in keeping pace with the times, and making the most of altered circumstances. I have many useful plants to recommend for this purpose before closing this Report, whereby large tracts of waste land may be reopened advantageously at little outlay.

The importation of plants last year has been unusually large, and of a varied description, comprising the following genera, viz. :—

Bœhmeria nivea.
Antiaris saccidora.
Datura sanguinea.
Jatropha panduræfolia.
Clerodendron macrophyllum.
Hoya grandiflora.
Ardisia acuminata.
Poinciana Gilliesii.
Plumbago Capensis.
Vanhouttia calcarata.
Medinilla speciosa.
Nematanthus longipes.
Habrothamnus Schottii.
Dipteracanthus affinis.
Abutilon Van-Houttii.
Gardenia Thunbergii.
Rhodostoma gardenioides.
Goethea strictiflora.
Coleus Blumei.
Maranta sanguinea.
Ixora coccinea, superba.
Dipladenia splendens.
Dipladenia urophylla.
Hexacentris Mysorensis.
Rhynchospermum jasminiflorum.
Dracæna ferrea, var.
Pterocarpus sp. from Pulo Penang.
Rondeletia speciosa, major.
Pandanus variegatus. etc. etc.

The first mentioned in the list is the celebrated *Grass-cloth* plant extensively cultivated in China, and whose fibres make the finest cloth the Chinese can boast of. I have not the slightest doubt as to its perfect adaptability to this climate and soil, and in the course of a few years it may become a weed. The *Antiaris* is the notorious Upas-tree of Java, about whose virulent properties so many fabulous statements have appeared from time to time. The *Pandanus variegatus* is another addition to our textile plants, and one of the most noble and beautiful plants that ever adorned a garden; the others on the list are chiefly new and interesting, collected in many parts of the world, and selected for this climate.

By the acquisition of these plants, we can now boast of possessing the finest fibres and the greatest number of textile plants in the world, hitherto of no avail to the country in general, and held of little value by individuals, but which may now be turned to the greatest account in a national point of view; the universal demand and scarcity of fibre, its high and daily increasing price, rendering the materials from which it is manufactured of the highest importance. We have many indigenous and eminently textile plants diffused over the island, but partially or not at all known to be applicable for textile purposes, except to a few gentlemen acquainted with the botany of the country. I have therefore prepared for general information fifty-one samples of fibres, the greater part of which are indigenous; as you will observe by the following list comprising them:—

Yucca gloriosa. Adam's Needle. 5–6 feet.
Yucca aloifolia. Common Dagger.
Bromelia Karatas. Silk-grass leaves, 10–12 feet.
Bromelia Pinguin. Pinguin.
Ananas sativa. Pine-apple.
Musa sapientum. Banana.
  „ var. Martinique Banana.
  „ *paradisiaca.* Plantain.
  „ *Cavendishii.* Chinese Plantain.
  „ *violacea.* Violet-flowered Plantain.
  „ *coccinea.* Scarlet-flowered Plantain.
Heliconia Bihai. Wild Plantain.
  „ *Brasiliensis.* Ditto of Brazil.
  „ *psittacorum.* Parrot-beaked ditto.
Tillandsia serrata. Wild Pine (epiphyte.
  „ *usneoides.* Wild Pine.
Pandanus spiralis. Screw-pine.
Agave Americana. American Aloe.
Canna Indica. Indian shot.
Triumfetta semitriloba. Common Burbark—a weed.
Malvaviscus arboreus. Bastard or Wild Mahoe.
Abroma augusta. Abroma.
Kydia calycina. Tree, 25 feet.
Helicteres Jamaicensis. Screw-tree.
Guazuma ulmifolia. Bastard Cedar.
Kleinhoffia hospita. Tree 25—30 feet.
Sida sp. Shrub, 6—8 feet.
Ochroma lagopus. Down-tree.
Cecropia peltata. Trumpet-tree.
Cordia Sebestena. Scarlet Cordia.

Cordia Gerascanthus. Spanish Elm.
,, *macrophylla.* Man-jack or broad-leaved Cherry.
Cordia Collococca. Clammy Cherry.
Brosimum spurium. Milk-wood.
Ficus elastica. India-rubber-tree.
,, *religiosa.* Pepul-tree.
,, *virens.* Wild Fig-tree.
,, *Americana.* Wild Fig-tree.
Hibiscus Rosa-Sinensis. Shoeblack tree.
Hibiscus liliiflorus. Lily-flowered tre
,, *esculentus.* Ochra.
Hibiscus elatus. Mahoe.
,, *latifolius.* Broad-leaved Mahoe.
,, *tiliaccus.* Sea-side ditto.
Lagetta linterria. Lace-bark.
Daphne tinifolia. Burn-nose bark.
Cocos nucifera. Cocoa-nut.
Artocarpus incisa. Bread-fruit.
Pterocarpus santalinus. Pterocarpus.
Crotalaria juncea. Rattle wort.

The above list will be found to comprise fibre of such quality and colour, from the Cocoa-nut Coir to filaments resembling fine silk in strength and lustre of appearance, as cannot be surpassed. I might have extended the list to greater length, but I believe the enumeration will convince the most sceptical that this island abounds with a highly valuable description of textile plants, some of which are considered troublesome weeds. Those of a ligneous nature will annually produce two crops of shoots, from which good fibre may be obtained, requiring no machinery whatever in preparing it for market. The method I have pursued, as being the most easy and simple, is this :—Macerate the shoots until the cuticle or outer bark separates freely from the true bark : the latter will then be removed readily from the ligneous part, and requires but little labour or knowledge to wash, dry, and pack the fibre for market : this would furnish healthy employment for children, the aged and infirm, and would not diminish the amount of labour on plantations.

For the plantain, Pinguin and all similar herbaceous plants, machinery is absolutely necessary to separate and clean the fibre advantageously; when this desideratum is accomplished, and with one or two years' practice, there is nothing to prevent Jamaica competing with any part of the world of ten times the same extent. The inducement to do so cannot be much greater than it is at present. I find, by a statistical account, that the imports of flax into the United Kingdom during 1853 amounted to 94,163 tons 14 cwt., and at the exorbitant price of £110 per ton, to which the average price of foreign flax has already risen, shows a sum of £10,358,007, which has been paid in cash for foreign flax fibre last year ; and since the prohibition of Russian hemp into European markets, prices and demand are increasing daily.

My motive for laying before you my views on this subject, and preparing the samples of fibre for your inspection, is, that I am anxious to submit to you, and through you to the agriculturists and people in general of this island, the desirability and advantages in an individual and national point of view to be derived from the adoption and extensive cultivation of fibrous plants. As I have already mentioned, the great scarcity, exorbitant price, and widely-spreading demand for fibre throughout the world, render the materials of which it is manufactured of much importance, particularly in this country, where labour is scarce and dear, and agriculture at its lowest ebb. Many of these fibres will be found of superior quality, and produced in greater abundance than any grown in temperate regions.

I have made a very moderate calculation of the produce of an established field with plantains, which I find to be as follows :—

An acre planted with suckers, at 10 feet apart, will contain 435 plants, and the first year will produce as many bunches of fruit worth 6*d*.	£10	17	6
Each stem will yield 1 lb. of finely-dressed fibre, worth 6*d*.	10	17	6
Amounting in all to, ...	£21	15	0

There can also be raised on the same land, along with the plantains during the first year, a crop of yams, corn, kidney-beans, and sweet potatoes, worth at least £20, thus realizing the first year £41-15*s*. The second year each plantain stoale will throw up three or more suckers, the quantity of fibre will thereby be tripled, and succeeding years would add to the produce; and if the plantain is cut before the fruit is formed, the quantity of fibre will be fully one-third more, of a far superior quality. I may here remark that the banana is a much hardier plant than the plantain; it will live and thrive at an elevation where the latter would not exist. In selecting any particular variety of the *Musa* for cultivation, great care ought to be observed, as on this point much of the success depends.

In connection with this branch of industry, other plants, although of less importance, ought not to be lost sight of, being available in meeting a great deficiency as materials for the manufacture of paper, such as many of our very soft and spongy woods, which cannot be classed among timbers; the various and inexhaustible supply of tough withes, reeds, grasses; and, perhaps superior to all, the refuse of arrowroot, as it comes from the mill, divested of its starch; many tons of this are annually wasted, being thrown on the dunghill. The above mentioned materials are far more likely to answer the purpose than the bamboo, so much used in China for making paper.

I shall conclude by briefly describing another plant (the *Pothos violacea),* admirably adapted for all descriptions of fine straw-plats, particularly where strength and richness of appearance are desired; its plat will be found superior to the best Leghorn plat. This plant, although an epiphyte, and growing plentifully at the roots and on the tops of the highest trees, at an elevation on the mountains not under 1,000 feet, may readily be cultivated in woodlands and moist places. The part made use of is the petiole, or footstalk of the leaf, which grows from eighteen inches to two feet long, and readily divides into strips of any dimensions, and contains a strong fibre, which the common plat made from the fan-palms does not, and seldom retains colour long. These advantages may tend to bring the plant into notice after awhile; and if, through my humble endeavours, any of the undeveloped resources of the country are brought into notice, a happy result will be effected.—*Hooker's Journal of Botany and Kew Garden Miscellany.*

Miscellaneous observations on some tropical plants.

By John Davy, M.D., F.R.S., &c.

The following observations, extracted from note-books kept whilst I was in the West Indies, were made in the Island of Barbadoes, between 1845 and 1848. Should any of them lead to further and more exact inquiry, I shall be more than satisfied.

1. *On the Juice of the Star-Apple* (Chrysophyllum Cainito, *Linn.)*

The juice of this luscious fruit has, I have found, the property of coagulating on exposure to the air very like coagulable lymph.

I have a note of one trial only. After dividing the fruit with a knife (the knife was much blackened, chiefly, it would appear, by the cortical part), the inner mucilaginous portion with the seeds was scooped out, well mixed with about an equal bulk of water, and pressed through a coarse linen cloth. What was thus obtained was semifluid (its coagulation had commenced), of a creamy appearance, and uniform consistence. Under the microscope it appeared to be composed chiefly of exceedingly minute granules, the largest not exceeding the $\frac{1}{10,000}$ of an inch in diameter, which were rendered brown by tincture of iodine, with the exception of a very few that were tinged blue. After two hours a pretty firm coagulum had formed, with the separation of a transparent fluid, and so great was the contraction as to be equal to about one-third of the diameter of the containing vessel, a circular glass one; and so coherent and firm was the coagulum itself, that it admitted of being lifted out without breaking or change of form. On the following day, the coagulum was found still more contracted, and in all its dimensions. The transparent fluid surrounding the coagulum was sweet. It was not rendered turbid by nitric acid. In a few days it began to ferment, and in a few more it became acid. The contraction of the coagulum continued increasing during several days. After about a fortnight it softened, became pultaceous, and emitted an offensive smell not unlike that of chyme as met with in the cadaver. Under the microscope, as before, it exhibited a granular texture, without the admixture of any fibres.

2. *On the supposed influence of the Papaw* (Carica Papaya, *Linn.*) *on Meat.*

It is commonly believed, both in the East and West Indies, that this tree has the property of rendering tender meat of any kind that is brought near it. In Ceylon the opinion is, that the effect is secured merely by suspending the meat beneath the foliage of the tree during the night. In Barbadoes greater reliance is placed in wrapping the meat in its leaves for a few hours with a portion of the young fruit.

The trials I had made afforded negative results, tending to prove that the effect on the meat was owing to other and incidental circumstances, rather than to any special power possessed by the plant. I shall mention one in illustration.

Of two fowls killed at the same time, one was wrapped in the leaves of the papaw by my cook in the most approved manner, not neglecting the introduction of a piece of the young fruit; the other was similarly treated, substituting the leaves and fruit of the squasse (*Cucurbita Pepo*, Linn.) Both roasted, were found equally tender. Other trials, using the leaves of other plants, gave like results.

The juice of the leaf, to which by some the supposed effect on the meat is attributed, appeared, as well as I could judge, to possess very little activity. It is milky, almost insipid, or only in the slightest degree acrid, and only after many hours promotes fermentation, and that in a very slight degree when added to a solution of sugar in water.

The incidental circumstances alluded to, whether the suspending of the meat under the leaves of a succulent plant exhaling moisture, or the wrapping it in the same, may be sufficient to account for the softening effect on the meat at a temperature such as that of Ceylon or the West Indies, so favourable to rapid change, that change on which tenderness in meat depends, without reference to any occult virtue in the plant.

3. *On the growth of the Bamboo-cane* (Bambusa arundinacea, *Wild*) *and of the Horse-radish tree*) (Moringa pterygosperma).

These plants afford good examples of the powers of vegetation within the tropics in their rapid growth.

I have been assured on good authority that the first, the bamboo, has been known to shoot fourteen inches in the twenty-four hours. I measured one six days successively, one that was about four feet from the stoale from which it sprung; during the first twenty-four hours it increased in height 6·75 inches; during the second, 5·25; during the third, 4·5; during the fifth, the same; during the sixth, 4·5 inches. The growth appeared to be in part terminal, and in part interstitial, the space between the joints in the new shoot having lengthened. These observations were made between the 22d and 29th September, and on a plant in a comparatively poor and dry soil.

A horse-raddish tree close to my house, that had sprung from seed, had, in nine months from the sowing of the seed, attained a height of at least twenty-four feet. Its trunk then exceeded in thickness a man's arm, and its branches, proportionally large, were at this time bent from the weight of its pods, some of which were ripe. It had received no culture or manure, and the soil on which it grew was stony, and no wise a fertile one.

I find amongst my notes another instance of the activity of tropical vegetation, in the rapid manner in which plants right themselves on change of position. Thus, in a flower-box in which weeds had taken the place of the flowers, placed on its end at six o'clock in the morning, I found in the short interval of twelve hours—viz., at six in the evening—that they, the weeds, had become bent at right angles to the soil in which they were rooted, so that the upper portion of their stems had recovered their perpendicular position.

The extraordinary productiveness of a tropical climate is by many considered an inestimable advantage, forgetful of the more than counterbalancing evil arising from the astonishing growth of exhausting and often smothering weeds. The poet may sing of the

> "redundant growth
> Of vines and maize, and bower, and brake,
> Which Nature, kind to sloth,
> And scarce solicited by human toil,
> Pours from the riches of the teeming soil;"

but the planter knows to his cost that in no part of the earth's surface is more care and industry required than within the tropics to make agriculture profitable.

4. *The purification of Sugar by Ants.*

If the juice of the sugar-cane—the common syrup as expressed by the mill—be exposed to the air, it gradually exaporates, yielding a light-brown residue, like the ordinary muscovado sugar of the best quality. If not protected, it is presently attacked by ants, and in a short time is, as it were, converted into white crystalline sugar, the ants having refined it by removing the darker portion, probably preferring that part from its containing azotized matter. The negroes, I may remark, prefer brown sugar to white; they say its sweetening power is greater; no doubt its nourishing quality is greater, and therefore as an article of diet deserving of preference. In refining sugar, as in refining salt (coarse bay salt containing a little iodine), an error may be committed in abstracting matter designed by nature for a useful purpose.

5. *Leaf of the Pigeon-Pea Tree* (Cajanus indicus).

The leaf of this tree on its upper surface is covered with a fine down. When incinerated, it yields a large proportion of fixed matter, derived from the soil, consisting chiefly of the vegetable alkali, of phosphate of lime, of carbonate of lime, of magnesia, and silica. The silica is derived from the down. Under the microscope it exhibits the same form as the down, viz., that of spiculæ, in shape not unlike the poison-fang of the serpent, tubular to a certain extent, and slightly curved, from about $\frac{1}{300}$ to $\frac{1}{200}$ of an inch in length, and in width at the base about $\frac{1}{3000}$. The substance of these spiculæ—that is, what remains after incineration—I infer to be silica, from its being infusible before the blow-pipe, and insoluble in the mineral acids.

Were the soil in which the plant grows to be examined, probably after a few years, these spiculæ might be found deprived of their vegetable organic portion, the residual silicious matter preserving their forms, and they might be mistaken for the skeletons of infusoria.

The leaves examined were from a plant growing in a volcanic soil, that of St. Kitts, where it is much used as a green-dressing to the cane-fields, and is considered very fertilizing. As its roots penetrate deeply, and the roots of the cane spread near the surface, it seems well adapted to counteract the exhausting influence ofthe cane.

6. *Peculiarities of the Sweet Potato* (Batatas edulis).

In its raw state this vegetable has a slightly acrid taste; on boiling it becomes sweet. In its sound state it is almost without odour; when it is worm-eaten, it acquires a perfume very like that of the hair-powder formerly in fashion called "The Marshall's," or that of the Vanilla-bean. The water in which it has been boiled has the taste of a weak animal broth.

Besides starch, its principal ingredient, it contains a certain quantity of matter resembling gluten. When the potato is cut, this matter exudes in a liquid milky state, viscid at first, diffusible through water, but soon becoming solid on exposure to the air. Under the microscope, when suspended in water, it appears in the form of granules of about $\frac{1}{20,000}$ of an inch in diameter, which were rendered brown by tincture of iodine.

Probably this matter is concerned in the production of the changes to which the sweet potato is subject, as well as conducing to its highly nutritious quality as an article of diet.

7. *Composition of the Ground-Nut* (Arachis hypogæa, *Linn.*)

This singular nut, becoming now of so much importance in connection with the industry and civilization of the western coast of Africa, not only abounds in oil, to which it owes principally its commercial value, but also contains a considerable quantity of starch—rather an unusual alliance—and in addition a large proportion of albuminous matter. The starch particles are about $\frac{1}{1000}$ of an inch in diameter. In no other instance have I seen so much starch associated with oil.

8. *The Coco-Nut* (Cocos nucifera).

Of all the gifts which bountiful nature has bestowed on the inhabitants of the tropics, this perhaps is the most valuable, and certainly the one most fitting them for a paradisiacal state of idleness. What other fruit is there in which, as in the coco-nut, we find a refreshing beverage contained in a cool limpid state, in a nutritious pulp of the consistence of blanc-mange, and as agreeable to the taste !

In a young nut, the lining pulp of which was thin, and almost of gelatinous softness, the quantity of contained fluid exceeded rather half a pint. It was quite clear, as much so as spring water, pleasantly, slightly sweet of specific gravity 10183. The pulp was rendered brown by the tincture of iodine. No starch particles could be detected in it under the microscope, nor oil globules.

The water of a ripe coco-nut, much less in quantity, and nearly transparent, was of the specific gravity 10203. It did not become turbid on boiling, or by the addition of acetic or nitric acid. Sugar, it may be inferred, was its principal ingredient.

The lining pulp was found to consist of 36 per cent. solid matter, and of 64 water, as determined by thorough drying. As is well known, it abounded in oil. I could detect in it no starch particles. In composition I believe it to be very like the ripe almond. The emulsion it makes is equal to that of the almond, and is an excellent substitute for milk for tea.

The coco-nut palm, I may add, thrives best by the sea-shore; it thrives even within high-water mark. Viewed in this light, may it not be considered as designed by a kind Providence to yield a drink in situations in which springs of fresh and wholesome water are often not to be found. It is only the traveller in such regions who can justly appreciate its value, and be sufficiently thankful for such a blessing. In Ceylon, the natives are in the habit of putting a portion of salt into the ground when they plant the nut, so convinced are they that salt is required for its successful growth.

9. *Cassava* (Manihot).

Two varieties or species of this plant are cultivated in the West Indies, the so-called bitter and sweet (*Manihot utilissima* and *Janipha)*; I say so-called, because neither of them is bitter or sweet, the words probably having been applied by the negroes, who with a limited vocabulary, are nowise exact in the use of terms. The tuberous roots —the parts used—do not differ in a very marked manner. That of the first-named has a more decided pungent acrid taste than that of the second; and from the few comparative trials I have made, appears to contain a larger proportion of glutinous matter and of hydrocyanic acid.

When a section of the root is made, three parts are distinguishable—an epidermis, very thin and tasteless, an inner laminated and bibrous layer, which is easily separated, the principal seat of the hydrocyanic acid and gluten; and innermost the body or main portion, abounding in starch contained in a cellular structure. On the division of the root, the glutinous matter exudes as a milky fluid, like that from the sweet potato, and with the same microscopic character. Its granules are about $\frac{1}{10.000}$ of an inch in diameter, and they are coloured brown by iodine. The starch particles contained in the substance of the root vary in size from $\frac{1}{5,000}$ to about $\frac{1}{800}$ of a inch in diameter.

In the mode of preparing the root as an article of diet, viz., by steeping for a short time in water, grating and pressure, a portion of the glutinous matter is separated, and in the dressing, whether by roasting or baking, the volatile poison, the hydrocyanic acid, is dissipated. To the gluten, which remains, probably the highly nutritious quality of the cassava is owing. We learn from Southey's History of the Brazils, that the Dutch "soldiers preferred mandioc to wheat, thinking it a stronger food;" and I have been assured by a gentleman who travelled in the wilds of South America in company with native Indians, that he lived for many days on no other food than cassava bread undergoing a great deal of fatigue, and found it to agree with him well and support his strength.

10. *Seed of the Cotton Plant* (*Gossypium herbaceum*).

The cotton plant, once so largely cultivated in the West Indies, offers this advantage, that it succeeds in poor soils; indeed it is said to succeed best in the poorest, and without manure. Another advantage is, that the old, infirm, and young, can be employed in collecting its produce.

The uses of the plant are many. Its cuttings are good for fuel; its seeds contain a good deal of nutritive matter, and are eaten by cattle and sheep, but not, I have been told, by horses, only by ruminating animals, and it is said they are even fatal to hogs; but whether true or not I am ignorant. The plant, as cultivated in Barbadoes, is of three years' duration.

One self-sown in my garden in that island yielded the first year 192 pods; in each pod or capsule there were 20 seeds, together weighing in their dry state 43·3 grains; the lining-wool—the cotton-wool—detached weighed 23·7 grains. The shell or epidermis of the seeds is black, thin, hard and tough. The substance of the seed inclosed is of a light yellow colour, of an oily taste, followed by a slightly acrid one. Under the microscope it is found to consist of oil globules, which are abundant, and of a fine granular matter. The seeds are broken (for instance when crushed in a mortar) without much difficulty, and with water on trituration yield a yellow emulsion. Thrown in a filter, the liquid which passes through is turbid and yellowish. It is not apparently altered by boiling; but on the addition of acetic acid flocculi separate, and on cooling subside. Now filtered the fluid is clear and colourless. The precipitate, it may be inferred, is in part at least casein. The larger portion of the washed kernel, that which is retained in the filter with the oil, soon acquires an unpleasant smell; kept a fortnight, and then mixed with lime, it gave off a distinct odour of ammonia. The oil is of a yellow colour, not volatile, and is fluid at 80° Fahrenheit.

The seed incinerated without the pellicle, after burning,—it burns with much flame,—leaves a coal that is easily reduced to ash, inconsiderable in quantity, composed chiefly of carbonate of potash, phosphate of lime, and magnesia. The same were found in the ash of the epidermis with some silica. Though growing in calcarious marl, no carbonate of lime or free lime could be detected in either.—*Edinburgh New Philosophical Journal, No.* 4. *October,* 1855.

Monthly Proceedings of the Society.

(Saturday, the 13th January, 1855.)

Baboo Gobindchunder Sen, Vice-President, in the chair.

Election of Officers and Council for 1855.

The Chairman announced that this being the anniversary meeting, the election of office bearers and Council for the current year should be entered on. The Members accordingly proceeded to the ballot, and R. W. G. Frith, Esq., and Baboo Rajendrolall Mittra, who were appointed scrutineers, reported the result to be as follows:—

President.—C. R. Prinsep, Esq.

Vice-Presidents.—William Haworth, Esq., Baboo Gobindchunder Sen, W. G. Rose, Esq., and Baboo Ramgopaul Ghose.

Secretary.—Mr. A. H. Blechynden.

Council.—Mr. A. Grote, Baboo Pearychand Mittra, Dr. H. Falconer, Mr. B. Warwick, Mr. C. A. Cantor, Baboo Sibchunder Deb, Dr. C. Huffnagle, Mr. Stewart Douglas, Rajah Protapchunder Sing Bahadoor, Mr. W. Blundell, Mr. R. M. Thomas, and Mr. James Church.

Standing Committees.

The revision of the various Standing Committees was next taken into consideration. On the recommendation of the Council, the names of the following Members were added to the Committees, viz. to the Cotton Committee, Mr. S. Douglas and Mr. W. Blundell; to the Silk, Hemp and Flax Committee, Mr. W. Haworth; to the Fruit and Kitchen Garden Committee, Mr. J. Agabeg; and to the Floricultural Committee, Mr. J. S. Elliot.

Annual Report from the Council.

The Acting-Secretary read the Annual Report.

It was then proposed by Mr. R. W. G. Frith, seconded by Mr. W. Blundell, and carried, that the Report as read be received and adopted.

The business of the ordinary monthly meeting was next proceeded with, and the proceedings of the last monthly meeting were read and confirmed.

The following gentlemen, who were proposed at the last general meeting, were duly elected Members:—

Lieutenant Hichens, Reverend W. H. Boyle, C. F. Hudson, Esq., and George Meares, Esq.

The names of the following gentlemen were submitted as desirous of joining the Society :—

Henry Erskine, Esq., Indigo Planter, Bijerah, Soorool,—proposed by S. H. Robinson, Esq., seconded by W. G. Rose, Esq.

Thomas Teil, Esq., Merchant, Kidderpore,—proposed by S. H. Robinson, Esq., seconded by W. G. Rose, Esq.

H. W. Beddy, Esq., Junior Assistant Commissioner, Arracan,—proposed by Lieutenant F. W. Ripley, seconded by C. A. Cantor, Esq.

Presentations.

The following presentations were announced :—

1. From Col. W. Sage, a bottle of Portugal onion seed.

2. From the Hon'ble J. Dorin, a packet of nine kinds of fine English fruit seeds.

Resolved—That they should be sent to the Society's garden.

3. From Captain Layard, Berhampore, through Mr. A. Grote, sample of fibre made from *Abelmoschus esculentus.* Captain Layard, in his letter accompanying the specimen, writes that it was prepared by Pension-Serjeant Montgomery, who says that the sale of the edible part of the vegetable would pay for the culture and manufacture of the fibre.

Referred to the Flax and Hemp Committee.

4. Selections from the Records of the Government of India, No. 6, on the Punjab. *Presented by the Government.*

5. From James Bedford, Esq., a few seeds of New Zealand ferns.

6. From the Secretary, a packet of grass seeds, and of a fine sort of flax seed, also a few seeds of the cultivated hop. Ordered to be forwarded to the Society's Garden.

7. From Dr. Withecombe, of Darjeeling, sample of nettle tow in use by the natives there. Referred to the Hemp and Flax Committee.

Motion.

The following Motion, of which notice was given at the last monthly meeting, was then brought forward :—

"That Mr. John Lambert Nash be requested to assist the Society in procuring seeds of cotton of the same description as he presented to the Society last December, and that a sum of money not exceeding 250 Rs. be placed at the disposal of Mr. Nash for this purpose. Proposed by Mr. S. Douglas, seconded by Mr. W. Blundell, and carried, that the above recommendation of the Council be confirmed."

Reports on various subjects.

The Reports of the Judges on the Flower, Fruit and Vegetable Show, held at the Town Hall on the 23rd December last, were then brought forward as follows :—

"The Judges have to report on an unusually small collection of flowers exhibited at this show. Such, however, was to be expected from the early period of the season, as well as from the late arrival of the Society's supply of English flower seeds, which could not admit of their affording any help to the show of annuals at this early date.

"Contributions from about a dozen gardens were exhibited, amongst which those from Mrs. Hay Stewart's and the Auckland Garden, were most conspicuous for their comparative number and variety. Some good specimens of *Chrysanthemums,* including new varieties, also of a plant of *Habrothamnus fasciculatus,* from Sir L. Peel's garden, attracted attention, as well as a very tastefully trained *Maurandya Barcleyana* from Mr. Thomas's garden. Nothing else calls for particular notice, and the Judges only felt justified in awarding the sum of 27 Rs. in prizes.

"Judging from the great throng of visitors which filled the Hall from the time of its opening to the public at 11 A. M., till nearly 1 P. M., when the prizes were awarded, the public taste for these exhibitions appears decidedly on the increase, and it is to be hoped that the willingness to contribute specimens and collections to the shows may grow in the same proportion.

(Signed,) BENJ. WARWICK.
" R. M. THOMAS."

"The Judges have the satisfaction to report a very good show of both fruits and vegetables on this occasion, considering the early period of the season at which it was held.

"Of the exotic vegetables, the Brassica tribe were well represented at this early date by three kinds of cabbage, viz., the early York, Battersea and drum-head, and by a splendid display of cauliflowers with large and well formed heads. The sulphur and white brocoli were also well represented, but of Scotch kale only a few heads of ordinary quality were exhibited. The green curled and broad leaved endive, large and well blanched, showed well. Only one basket of spinach, but that of very good quality, was placed on the table. Lettuces of four kinds were shewn in abundance, viz., brown Dutch, black seeded cos cabbage, and Paris cos, which were large and well blanched. The red and white seedling celeries were better exhibited at this time than at any former show. Celery from offsets was abundant also, but of inferior quality. Two kinds of knole-kole were plentiful and well represented. Turnips of three kinds were abundant, viz., white flat, yellow stone, and large globe, and all of good quality. Onions and leeks were shown in abundance, and of excellent quality. The long orange, short horn, and long red carrots were quite as good as have been submitted at any former show.

"The turnip-rooted and long red beet were also excellent, several kinds of radishes were well represented, particularly those exhibited by Mr. George Bartlett's *mallee*.

"Four kinds of potatoes were brought forward in abundance, and of excellent quality. Of beans the French and Lima were well shewn, a few kinds of peas were brought forward in good order, more especially those from Mr. Thomas's garden raised from English seed. Asparagus was shown in small quantities, but of good quality. Water-cress was abundant, and of a good green color.

"Of fruits, sapota, orange, pineapple, pumplenose and bél were very plentiful, and good in quality. Plantains, pomegranates, guavas and papias, were also exhibited in abundance, and a few other inferior kinds.

"In indigenous vegetables, the competition was very spirited, and the whole appeared of excellent quality.

(Signed,) Wm. G. Rose.
„ Peary Chand Mittra.
„ St. Douglas."

The Report of the Hemp and Flax Committee, on a sample of fibre presented by Mr. F. W. Crump, Monjoul factory, Monghyr, and first submitted to the December meeting, was then brought forward as follows :—

"We are left without any information, by Mr. F. W. Crump, as to the plant or shrub from which this fibre is produced.

"Its appearance and general character indicate to me that it may be one of the hibiscus, rather than a cannabis or *hempen* fibre.

"If Mr. Crump, can find use for it in factory purposes, it must have a value ; but what that may be, as an article of general commerce, can only be determined by some trial or trials made of small quantities introduced into this or the English markets.

"The fibre is of excellent length, being 6 or 7 feet.

"It is *fine* and *round,* but so very moderately strong, that it may properly be termed weak. It is remarkably light in its weight, which is not a very favorable symptom of strength and value.

"Its colour is white and pretty good, but it is foul and ill got up, and is very little glossy.

"In the drying process as well as in the steeping, it seems to have been somewhat neglected, for in many cases the fibres remain much clotted together, and are not duly opened out and rendered free ; hence in these defects we may find the cause of general tenderness and weakness, or at all events an excess of weakness.

"It would be well if Mr. Crump in his future trials would give us better prepared specimens, and more information of origin.

(Signed,) Joseph Willis."

"This fibre is too weak to be of any use. The great question is in all these cases, what is the cost of production.

(*Signed,*) WM. G. ROSE."

The Report of the Cotton Committee on four samples of cotton from Mr. Sturmer, Azimgurh, was next submitted as follows :—

"No. 1 is very fine, too flimsily fine in fibre; is very weak, very short, bad in colour, and of more value to the paper-maker than the cotton spinner, and which last named, could but use it with immense loss.

"No. 2 is whitey-brown in colour, and the same may be said of it as of No. 1, save that it is less acceptable or more valueless than No. 1.

"No. 3 is the common brown cotton already so well known in our Society, and is in its character and condition like Nos. 1 and 2; only that it is worse than either of them in all the characteristics which attend good cotton.

"No. 4 from indigenous seed is the best of all the specimens; for although of inferior quality from its shortness, harshness and weakness, it has still some practical use in it for the cotton spinner, at a very low value however.

"All these cottons seem to me to have been grown under circumstances uncongenial to them, and from some cause they are remarkably tender and weak.

(Signed,) JOSEPH WILLIS."

I have examined these four specimens of raw cotton, and concur with Mr. Willis in his opinion as to the merits or rather demerits of them all. No. 4, from indigenous seed, appears to be the most useful wool of the samples exhibited, but it is of very short and rough fibre, and I do not think would fetch a price at home sufficient to cover the cost of its production. Nos. 1, 2 and 3, being unsuitable for the Home markets, do not require any comment on them.

(Signed,) JAMES COWELL.

The next Report was from the Hemp and Flax Committee on a sample of fibre made from a creeping plant common in the Midnapore district, and presented by G. F. Cockburn, Esq.

For this Report see Part I, page 150.

The Gardener's Monthly Report for December, was then brought forward, Mr. McMurray writes :—

"In drawing up my report for the month of December last, I have first to state that a large quantity of arrow-root tubers, tapioca plants, Tenasserim and Chota Nagpore red yams, have been cultivated in the garden during the past season, the whole of which are now in a fit state to lift out of the ground, and may be made available to the Members.

"The monthly issue of fruit trees, flowering shrubs, sugar-canes, and tuberous-rooted plants of sorts, distributed during the last twelve months from the garden, is hereto annexed for the information of the Society, and may be deemed a fair season's work; in addition to this, a large number of cuttings have been issued, and with the cultivation and saving of seeds, and the carrying on the several other operations in the garden during the past year, will speak for itself.

"In commencing the season 1855, I will here state for the information of the Members and others, that six hundred (600) peach grafts of fifteen kinds, and seven hundred (700) mango grafts of sixteen sorts, together with pumplenoses, oranges, limes, lemons, and a number of other kinds of fruit trees, are now ready for issue at the reduced scale of prices, which has brought within the reach of every one a means of procuring the best kinds of fruit trees at a comparatively trivial cost.

"The Pegu rice seed presented to the Society in June last by the late Mr. W. Earle, has ripened a good crop of grain, which is now forwarded for laying before the next meeting of the Members.

"The box, containing forty-eight kinds of rose-cuttings of sorts, received on 9th December last at the garden from Mr. J. Carter of London, were all found dead on opening the case.

"Mr. B. Warwick's presentation of one plant of *Cobœa scandens* was received on the 9th December, in good health.

"Mr. C. Ladd's contributions of small quantities of Californian wheat and potatoes were received on 18th, and sown on the 20th December, and have germinated freely, and are doing well.

"Mr. C. Macleod's presentation of ten verbena plants of sorts, and one *Hydrangea hortensis* were received on the 22nd December, in very good health.

"Mr. F. Pereira's contribution of two orange and one lemon plant from China, were received on the 22nd December in very good order.

"The case containing China plants from Mr. R. Fortune was received in the Garden on the 9th inst. The contents were found in excellent condition, and the seeds which had been scattered over the soil had germinated freely."

Flower, Vegetable, and Fruit Shows, for 1855.

The dates on which the remaining shows of the season are to be held, as recommended by the Council, were adopted by the Meeting as follows, viz., January 23, February 15, March 16, and April 12, each to comprise both Flowers, Fruits and Vegetables.

Communications on various subjects.

The following letters were then read: –

1. From the Hon'ble Sir Lawrence Peel regretting his inability, from indisposition, to attend the Anniversary Meeting of the Society, and hoping the meeting would proceed at once to the election of another President.

2. From Mr. R. Fortune, dated Shanghae, December 3d, 1854.*

3. From the Secretary and Directors of the Juvenile Improvement Society, Bombay, requesting the aid of this Society. *Referred to the Council.*

4. From C. Gubbins, Esq., offering some information on the cultivation of the Carob tree at "Rohilkund."

"Mr. Gubbins writes the Carob tree (*Ceratonia siliqua*) I find succeeds admirably in Rohilkund. I planted some seeds at Meerut in 495-0, which came up some 4 or 5 seedlings; in February, 1853, on my return from the Cape, I found but one surviving, a little dwarf about 1½ foot high. I took it to Bijnore, and when I left it in March, 1854, it was at least 4½ feet high. Mr. Wingfield writes me now from Bijnore that it is still in a most flourishing state. The information may be acceptable to the Society, as shewing them where in the plains of India they will be likely to succeed in introducing this most valuable tree."

(*Saturday, the* 10*th February*, 1855.)

Baboo Gobindchunder Sen, Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed.

The following gentlemen, who were proposed at the last general meeting, were duly elected Members:—

Henry Erskine, Esq., Thomas Teil, Esq., and H. W. Beddy, Esq.

The names of the following gentlemen were submitted as desirous of joining the Society:—

Lieut. Edmond Walter, Engineers,—proposed by Major J. R. Western, seconded by Major W. Abercrombie.

Lieut. George Tomkyns Chesney,—proposed by Major J. R. Western, seconded by Major W. Abercrombie.

Robert Manderson, Esq., Civil service,—proposed by S. H. Robinson, Esq., seconded by B. Warwick, Esq.

Lieut. C. Murray, Commandant Sebundy Sappers, Darjeeling,—proposed by S. H. Robinson, Esq., seconded by S. Douglas, Esq.

Alexander Forbes, Esq., Agent, Dacca Bank,—proposed by J. S. Elliot, Esq., seconded by S. Douglas, Esq.

R. F. Ross, Esq., Merchant,—proposed by B. Warwick, Esq., seconded by S. H. Robinson, Esq.

Presentations.

The following presentations were announced:—

1. From Lieut. F. W. Ripley, Principal Assistant Commissioner, Sandoway, eight bales of jute and other fibres from Arracan.

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* For this letter, see Part I, p. 99.

2. 11 volumes and 7 pamphlets of Proceedings of American Agricultural Societies. *Presented by E. A. Pettis, Esq.*

3. A fine specimen of squash and some paddy grown from Tenasserim seed. *Presented by R. Morrell, Esq.*

Motion.

The adoption of the following Resolution of the Council was then moved by Baboo Peary Chand Mittra, seconded by C. A. Cantor, Esq., and carried :—

That the Schoolmaster of the Society's garden school be required to furnish a monthly Report of the progress of the school, and that the Garden Committee be also requested to report periodically on its progress, and that further it be recommended to the Society to award prizes annually to such of the boys as have manifested most improvement.

Horticultural Shows.

The Acting-Secretary reported that he had received an intimation from Major Bazeley that the tents for the next show would not be available on the 15th instant—the date for the next show as proposed at the last Meeting; but that they could be available on the 23rd instant.

Resolved—That as the 23rd and 24th instants will be Mail days, Major Bazeley be again applied to, to lend the tents if possible for the 26th instant, or if not available on that day for the 24th instant.

Defaulters to the Socie'y.

On the recommendation of the Council it was resolved that the following two members be struck off the list, and their names published as defaulters, in accordance with the rules of the Society, their subscriptions being more than two years in arrear, and their having given no reply to the applications made to them for payment, viz.:—

Brigadier G. Hampton, Nizam's Service.
Capt. P. M. Taylor, Nizam's Service.

Reports.

The Reports of the Floricultural and Kitchen Garden Committees on the Horticultural Show held on the 27th ultimo, were then read as follows :—

Owing to the still early period of the season, and the continued backward state of growth of the annuals arising from the late arrival of the English seeds, the Floricultural portion of this show was again but a meagre one. For though a much larger and more attractive one than that held on the 23rd ultimo, it was neither in extent nor variety on a par with those of the January shows of former years—the produce of only some 18 gardens being brought forward, whereas at the January shows of 1853 and 1854, about 30 gardens contributed specimens.

There was a fair show of violets from four gardens, also some good specimens of hearts-ease, especially those from the gardens of Mr. J. Cochrane, and Mr. R. M. Thomas, to both of whom prizes were awarded. There was also a good show of *Euphorbia jacquiniflora*, a few good roses and camellias, but nothing else calling for especial notice, and 67 Rupees was the total amount distributed in prizes. The show was well attended by the public.

The Judges beg to bring to the notice of the Society the kind assistance they received in making the arrangement for this show from Major Bazeley, Commissary of Ordnance; Captain Fagan, Garrison Engineer; and Messrs. Burn and Co., for the loan of tents, flower stands, &c.; also to the Officers of H. M. 98th Regiment, who allowed their Band to attend and enliven the scene.

(Signed) A. GROTE.
,, BENJ. WARWICK.
,, R. M. THOMAS.

This show was as usual at this season of the year well supplied with the better kinds of European vegetables, amongst which may be especially noticed the different sorts of the Brassica tribe, which were abundant and well exhibited, viz.: cabbage, early and large York, sugar loaf, Battersea, Savoy, drumhead and red. Of cauliflower the display was very good, the sulphur and white brocoli were shewn in abundance, and of excellent quality; the green curled and common Scotch-kale were plentiful, and of good quality, turnips of sorts were placed on the tables, viz: white flat Dutch, yellow stone, large globe, and red topped; the green curled and broad leaved endive were plentiful, large and well blanched.

Lettuce of four kinds were brought forward in good order and abundant, viz.: Paris cos, blackseeded cos, cabbage and brown Dutch; one basket of prickly seeded, and another of the broad leaved spinach, were placed on the table of very good quality. The red and white seedling celery may be looked upon as the most improved vegetable, as a salad, produced at this season; celery from offsets was also represented, but of an inferior quality. The red and white knole-kole were plentiful and good. Onions and leeks were abundant and of excellent quality; the short horn, long, red, large yellow, and black carrots were, as usual, well represented. Scorzonera was represented at this show for the first time, and in excellent order. The use of this may not be generally known from its scarcity in the bazar, but in Europe, where the root is much esteemed, it is pulled when about 2 or 3 inches in circumference, after which the outer rind is scraped off, the root is then steeped in water to extract part of its bitter flavour, then boiled or stewed in the same way as carrots or parsnips, and is considered more wholesome than either when well prepared for the table. The long red and turnip-rooted beets was shown in abundance and of good quality. A number of specimens of mangold wurzel were brought forward of large size and of good quality. Scarlet radishes of various kinds were well represented, and four kinds of potatoes were exhibited in different stages of maturity, and, as now usual at the shows, of excellent quality, the French, Lima, and long pod beans were brought forward in abundance, and of very good description. Of peas, numerous baskets were placed on the tables, but without names to distinguish one kind from another, and this is difficult to do after gathering; however the marrowfat, blue imperial, early frame, and the different kinds of sugar peas were discernible, and of good quality. The collection of six kinds of pot herbs were well got up, and of good quality. A few heads of horse radish were exhibited in good order.

In the Fruit department the indigenous and imported oranges were very conspicuous. The lemons, limes, pine-apples, sapotas, plantains, and pomegranates were brought forward in abundance, and of excellent quality. The large and small bêl, and long and round plums were also exhibited abundantly, and of superior quality. Rose apples, guavas, camrunga and papeas were brought forward in large quantities, and of good quality, with a number of other inferior kinds to complete the collection exhibited.

The competition for prizes in indigenous vegetables and roots was spirited. Amongst them may be mentioned the brinjall, ginger, beans of sorts, yams, pumpkins, Indian corn, and the different kinds of sâgs, as the most conspicuous and well represented.

The Committee being desirous of drawing the attention of the competitors to the *particular improvements* required in the different vegetables and fruits, have requested Mr. McMurray to draw up a paper specifying such tests of improved culture, and containing practical directions as to their successful growth, that it may be rendered into Bengali, and published in the *Indian Agricultural Miscellany*, for general information.

(Signed,) PEARY CHAND MITTRA
,, WM. G. ROSE.
,, ST. DOUGLAS.
,, JOSEPH AGABEG.

The gardener's monthly report for January was then read. Mr. McMurray, writes as follows :—

"In the preparation of my Report for the month of January, I have first to notice the present state of the Chinese fruit trees, and other useful plants, received from Mr. R. Fortune, in March last, and to state that the greater number of them have been planted out in the open ground in the garden, amongst which are the Canton pumplenose and lime ; the former has been increased in number and planted out. Of the flat and large fruited Shanghae peach trees, several grafts have been taken off, which are now ready for issue at the fixed scale of prices. The Myrica species *Yangmae*, said to yield a fine description of fruit, is still cultivated in the pot, owing to the delicate appearance and state of the plant, which may start into vigorous growth as the spring advances. Three plants of the *Citrus Japonica* or *Cum-quat* tree, have made a good growth, and are now setting a few fruit. Of the useful forest trees planted out and doing well are the *Chamærops* species or hemp palm; the rice-paper plant from Formosa; the *Rhus* species or true varnish tree; the *cæsalpinia* species, and the *fraxinus* species or wax-insect tree, the whole of which are doing well; but more especially the wax-insect tree, has made a vigorous and healthy growth, and from the habit of the plant, sending out rootlets from the stem, above the ground, during the rainy season, it is likely to continue a healthy and easily multiplied tree. From these, at present apparent facts, it may not be deemed out of place at this time to suggest to the Society the advantage that may be obtained by importing the true wax producing insect into Bengal, which may be expected to thrive as well in this climate as the plant upon which it lives. Of the flowering plants received with the above are the *Forsythia viridissima, Azalea Indica*, and *villata, spathoglottis fortunii*, and *lycopodium* species, which are all doing well. With the above plants several kinds of seeds were received, which in general germinated freely, and of which the following three kinds came up very abundantly, and a few plants of each sort may be made available to the members, viz., sweet chestnut, hemp palm, and *Salisburia adiantifolia*. The cultivated and wild green dye plants (about 550) were raised at the same time from seed, the whole of which have made a vigorous growth since planted out in the open ground, and from the present appearance of the plant, will flower during the approaching summer, and may yield a quantity of seed for distributing to the Members.

"The eighteen kinds of Scotch grass seed, received from the Secretary, have been sown, and also the twenty-three sorts of ditto, from Peter Lawson and Sons, of Edinburgh, none of which have as yet germinated.

"The nine sorts of English fruit seed, presented to the Society, by the Hon'ble J. Dorin, have also been sown. Of the case of vine and fig cuttings received from Mr. J. Carter, of London, the former arrived in a pretty healthy state, but the latter was received in such a dried-up state, that I have no hopes of any of them striking root.

"Mr. Maddock's contribution of twelve bread-fruit tree cuttings from Ceylon, were received in good health on the 31st January.

"Mr. A. D'Cruze's presentation of two kinds of new rose plants, were received on the 5th instant, in a healthy condition, and two thousand vine cuttings have been put down from the contributions of Messrs. S. Douglas and R. Blechynden."

With reference to Mr. McMurray's recommendation, that measures be taken to introduce the wax-insect into this country, it was resolved that the question be referred to the Council, for consideration and report to the next Meeting.

Communications on various subjects.

1. From Baboo Peary Chand Mittra, as Secretary of the Calcutta Public Library, a letter stating that the Curators of the Library had instructed him to apply to the Society for permission to convert the lower vestibule of the Metcalfe Hall into a public reading room, for the mutual convenience of the Members of the Society and of the Library; upon which it was proposed by Mr. W. G. Rose, and seconded by Mr. T. E. Carter :—

"That the request of the Curators for the use of the lower vestibule as a public reading room cannot be complied with, with reference to the convenience and wants of the Society."

Amendment proposed by Mr. J. Agabeg, and seconded by Mr. S. Douglas :—

"That the communication from the Secretary of the Calcutta Public Library just received, be referred to the Council for consideration and report.

The amendment being put to the vote was lost, and the original motion carried.

2. Communication from A. Grote, Esq., of an extract of proceedings of the London Entomological Society, awarding a prize for the best Essay on the "Coccus," a prize of five pounds five shillings. This Mr. Grote recommended, should be published on the cover of the next number of the Society's Journal.

Resolved—That Mr. Grote's suggestions be adopted.

3. From C. R. Prinsep, Esq., accepting the office of President of the Society.

4. From J. L. Nash, Esq., stating that he will have much pleasure in endeavouring to procure for the Society a further supply of cotton seed from Mr. Seabrook's plantation, and that he had written to his friends on the subject.

5. From Captain H. B. Weston, Garden Reach, communicating an effectual method of destroying rats in gardens, by blowing the fumes of burning sulphur into the rat holes, by means of a common bellows.

6. From Major J. Hannyngton, Chota Nagpore, stating that he does not find any superior kind of potato cultivated there; but was sending down to the Society ten seers of a red sort much esteemed by the people there, and which he considers may be suitable for the Cossyah Hills.

7. From Captain J. Eliot, requesting the Society would import a number of Cloches for sale at cost price to members. This was accompanied by a report from the Council unfavorable to Capt. Eliot's request.

Resolved—That the recommendation of the Council be adopted.

8. From Messrs. Grindlay and Co., London, stating that the two cases of American seeds lost on the *Maranon* in August last, were not insured.

9. From Mr. John Pinches, dated November 27, stating that in consequence of the obverse die of the Society's medal having failed in hardening, he will be unable to send it by the mail of December, but hopes to do so by the beginning of January.

(Saturday, the 10th March, 1855.)

Baboo Gobind Chunder Sen, Vice-President, in the chair.

The proceedings of the last General Meeting were read and confirmed.

The following gentlemen, who were proposed at the last General Meeting were duly elected Members: —

Lieutenant Edmond Walter, Lieutenant G. T. Chesney, Lieutenant C. Murray, Messrs. Alexander Forbes, Robert Manderson, and R. F. Ross.

The names of the following gentlemen were submitted as desirous of joining the Society :—

William Becher, Esq., of Gowhatty,—proposed by Lieutenant-Colonel F. Jenkins, seconded by Mr. W. G. Rose.

T. J. Sarkies, Esq., Calcutta,—proposed by Mr. J. Agabeg, seconded by Baboo Peary Chand Mittra.

G. J. Christian, Esq., Civil service, Etawah,—proposed by Mr. C. C. Jackson, seconded by the Secretary.

Captain Roderick Robertson, (70th Regiment N. I.) Superintendent Butty Territory, Sirsa,—proposed by Mr. Archibald Grant, seconded by the Secretary.

C. H. Lushington, Esq., Civil service, Calcutta,—proposed by Mr. Arthur Grote, seconded by Dr. Falconer.

C. Beadon, Esq., Civil service, Calcutta,—proposed by Mr. Grote, seconded by Dr. Falconer.

T. G. Swinden, Esq., Calcutta,—proposed by Mr. C. J. Sutherland, seconded by Mr. W. G. Rose.

Lieut. H. M. Garstin, Adjutant 36th Regiment N. I., Delhi,—proposed by Major R. H. Baldwin, seconded by the Secretary.

Presentations.

The following contributions were announced : —

1. Posthumous Papers of the late W. Griffith, Esq., *Notulæ ad Plantas Asiaticas*, and *Icones Plantarum Asiaticarum*, Part IV. Dicotyledonous Plants, 5 copies of each. *Presented by the Government of Bengal.*

2. Oldham's Geology of part of the Khasi Hills, 2 copies. *Presented by the Government of Bengal.*

3. Journal of the Asiatic Society of Bengal, No. 7 of 1854. *Presented by the Society.*

4. Buist's Index to Books and Papers on the Physical Geography, Antiquities and Statistics of India. *Presented by the Secretary.*

5. Ten seers of potatoes from Chota Nagpore. *Presented by Major J. Hannyngton.*

Major Hannyngton remarks that he is not aware that any superior kind of potato is cultivated in the Chota Nagpore country, but that the red sort now sent is of moderate size, appears to be perfectly acclimated, and considerable quantities of it are procurable. Major Hannyngton adds: "though not a fine sort, they are much esteemed by the people, and as this climate probably resembles many parts of Assam, they would no doubt grow freely there. About 48 seers for the Rupee may be obtained at this season, and if you desire it I shall be happy to procure them for you."

Resolved—That these potatoes be forwarded to Col. Jenkins, and that if they be approved of, the Society avail itself of Major Hannyngton's obliging offer of further assistance.

6. Sundry specimens of rice and millet raised at Buttala, in the Punjab, from Chinese seed; of Chinese hemp; and cotton raised from Petty Gulph (North America) seed. *Presented by J. H. Prinsep, Esq.*

The specimens of fibre and cotton were referred to their respective Committees.

7. Various specimens of cotton and cotton seed, of cloths made solely from the fibre of *Agave Cantula,* and from the same fibre mixed with the silk of the mulberry and tussur worms; also samples of paper manufactured from the fibre of *Hibiscus esculentus. Presented by Dr. R. Riddell.* *

Resolved—That Dr. Riddell, be requested to send specimens of the white description of paper alluded to in his letter, and that they be forwarded, with the specimens already received, to the Society of Arts of London, and to Dr. Royle, for examination and report.

8. Specimens of munjeet from Odypore, of rattans from Arracan, of dyes and gums from Meerut, of wax from Sylhet, &c. *Presented by the Government of Bengal.*

The above form a portion of the surplus stores intended for the Paris Exhibition.

The following articles were also placed on the table:—

A. A full sized, simple and complete working machine for preparing flax, as used in Yorkshire, consisting of a swingle stock, tailed swingles, cleaver, a breaker, a scutcher with spare teeth, and a seed beater, the whole costing about twenty-five Rupees.

The above was procured by the Secretary during his recent visit to England.

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* For full particulars respecting these samples. See Part I, p. 112.

B. One hundred bronze medals for distribution to native gardeners at the periodical exhibitions, also the two gold medals presented by the Society, in 1853, to Messrs. Carver and Co., and Bates Hyde and Co., both of Massachusetts, United States of America, for their effective machines for separating the ordinary short staple cotton grown in India from the seed.

These had also been forwarded by the Secretary, having been struck off in London from the die recently prepared for the Society.

C. A fruit of the Calabash tree, *Crescentia Cujete.* from the Society's garden.

D. An impression consisting of 500 copies, just out of press, of Part V, Vol. I of the *Indian Agricultural Miscellany* in Bengali.

E. A small supply of fruit and other seeds, such as pine, yew, laurel, holly, privet, broom, cypress, scarlet thorn, &c., received from Mr. James Carter.

Resolved—That a portion of this supply be transferred to the Society's Garden, and the remainder reserved for members desirous of giving them a trial.

Horti-Floricultural Exhibitions.

The following reports of the Judges on the show of vegetables, fruits and flowers, held in the Auckland Garden, on the 26th February, were read :—

"*Horticultural.*—The Judges have the pleasure to report that the third show of fruits and vegetables, held in the Auckland Garden on the 26th February, may be considered fully equal to any former exhibitions held at the same period of the year; for instance the quantity and quality of the seedling celery brought forward on the present occasion was decidedly superior to any specimens previously exhibited. Celery from offsetts was also shown, but as usual only fit for flavouring soups, &c.; parsnips, salsify and scorzonera roots were introduced in abundance for the first time in any quantity, and were of excellent quality. A few bundles of asparagus exhibited this delicate vegetable well. Of globe artichokes there were many baskets, and all of excellent size and quality for so early in the season. Among the *Brassica* tribe several enormous specimens of the drumhead cabbage were exhibited together with the more delicate kinds, such as sugar-loaf, Savoy, early and large York, Battersea and red, the whole were shown in excellent order. Of the kale several well grown and curled heads were exhibited; the red and white knole-kole were brought forward in abundance and of pretty fair quality. The Windsor and long pod beans, French and Lima beans were well represented, and of excellent quality. Peas of several varieties were submitted in abundance, but more especially the marrow fat, imperial blue, and sugar varieties, and all were of excellent quality; leeks and onions were well represented. The broad-leaved and curled endive were well blanched and in good order, the cabbage, brown Dutch, and cos lettuces were large and well exhibited. Squash and pumpkins were of good quality, abundant and well represented. Carrots of five kinds were brought forward, viz.: short horn, Altringham, large, yellow, red and white. The long red, and globe beet roots were plentiful, large and fine. Mangold-wurzel was shown, but not of so fine a description as might have been expected at this season of the year; the collections of pot herbs were particularly good. Horse radish was abundant and of pretty good quality. The white flat, Dutch, yellow stone, globe and red turnips were plentifully and well represented; the prickly seeded and broad leaved spinach were exhibited in excellent order. Potatoes of four varieties were brought forward in different stages of maturity, the whole of which showed well. Several baskets of well grown tomatoes were placed on the stands; water and curled cresses were shown in a tender and green state.

Of indigenous vegetables, the brinjals, cucumbers, dherroos, jhinghaw, kurilah, Tenasserim yams, pulwul, Indian corn, ginger, chilly, capsicums, sâgs and seems were all represented in abundance, and apparently of good quality.

In the fruit department, guavas of two kinds, limes and pumplenoses were plentiful, and of good descriptions. Pomegranates, papias, soursops and plantains were well represented. The large and small bêl were shown in abundance and of fair quality.

Sapotas, long plum, and loquats were brought forward in abundance and of very good quality. Strawberry, and mulberry fruits were of excellent quality, rose apples, and king-cocoanuts were shown of superior quality; pines, and custard apples, and China oranges, were brought forward in small quantities, and of pretty fair quality.

The competition was spirited, and the sum of Rupees 233 was awarded in prizes to 55 mallees.

(Signed,) WM. G. ROSE.
" ST. DOUGLAS.
" JOSEPH AGABEG.
" PEARY CHAND MITTRA."

"*Floricultural.*—The Judges have the satisfaction to report on this flower show as by far the best of the three yet held during the current season, and that both in the number and variety of flowers exhibited, they consider it may compare favorably with the best shows held in former years by the Society. The stands were particularly rich in *Verbenas*, *Oxalis*, and *Heartsease*, in the latter more so than remembered at any former show, and it would seem now to be demonstrated that the difficulty in rearing these attractive annuals is at last overcome by our Floriculturists, there being at least two good and some inferior collections, and several fair *specimens exhibited on this occasion. As next worthy of notice, the Judges may refer to the collections of* **Asters, *Begonias,* and bulbs, and especially to the well grown plants of *Ranunculus* and *Anemone* shown by Mr. Griffiths and Mr. Stalkartt, for which prizes were awarded. There was a fair show of phloxes also, but no new varieties, for which only prizes were offered. Whilst referring to *Polemoniaceæ,* however, the Judges desire to record their satisfaction at the progress made in the graceful plant *Cobœa scandens:* the first solitary specimen of this exotic was exhibited at the flower show held in March, last year, whereas at the present show eight well developed and healthy plants were submitted for competition. Another novelty at our shows was the *Centradenia floribunda,* a plant of which, in very full flower, was shown by Mr. E. Currie.**

" Though early in the season for *Orchidaceæ,* there were a few good plants exhibited; also some fairly grown *Franciscea*s. Of new cut specimens *Rosa pumila* and *Passiflora Buonaptia,* from Mr. Pereira's garden, and a plant of the Forget-me-not from the garden of Mr. Thomas were introduced: the latter for the second time, it having been first exhibited by Mr. Pereira at the February show of 1854. The prizes awarded amount to 126 Rupees.

" The Judges have again to express their thanks to Major Bazeley and Messrs. Burn and Co. for the use of tents and stands for the show, and to the Officers of H. M. 35th Regt., who obligingly allowed their Band to come from Dum-Dum and play during the hours of exhibition.

(Signed,) A. GROTE.
,, BENJ. WARWICK.
,, R. M. THOMAS."

In connection with the above Report a recommendation was submitted from the Council that in consequence of the February show having, from unavoidable causes, been postponed to the latter end of the month, there be no show in March, as originally proposed, and that the show fixed for the 12th of April, be held in the Town Hall.

Resolved—That this recommendation be adopted.

Nursery Garden.

The Gardener's monthly Report was next read :—

" In the concluding para. of my Report for January last, I stated that the several kinds of Scotch grass seeds contributed by Peter Lawson and Sons, and that obtained by the Secretary from the Botanic Garden of Edinburgh, had been sown in *gumlahs.* I have now to remark that many of the sorts have germinated very freely, more especially those kinds received from the Botanic Garden have vegetated exceedingly well, as will be seen from the annexed statement of each kind.

"The hop seed received from Mr. J. Carter, of London, has not come up, but the linseed forwarded by him has yielded one hundred per cent. where it was sown in a *gumlah*. [This seed yields a plant with white flowers: it is stated to have been discovered by Sir R. Schomburgh, in the course of his travels in Guiana, growing on the banks of the river Orinoco. He considered the plant to be taller than the ordinary blue-flowered variety, and the fibre to be finer and whiter.] Had this linseed been sent to the garden on its arrival at Calcutta in December last, we might have obtained a crop of seed or fibre from it this season, but owing to the advanced period of the year, when the seed was received by me for sowing, there was no chance of gaining either; consequently I have only sown a small quantity of the seed in *gumlahs*, and retained the remainder for sowing at the close of the ensuing rains

"Three out of the six kinds of seeds presented to the Society in January last by Mr. R. Fortune have germinated, viz: the wild and cultivated green dye plants of China and *Cryptomeria Japonica.*

"The China mulberry plants presented to the Society by Mr. Emerson in 1853, are at present loaded with such a heavy crop of fruit, that the branches are actually weighed down to the ground. I send a basket of the fruit, and a branch with the fruit on, for laying before the present meeting of the Members.

"The *Crescentia cujete* tree. presented to the Society in December, 1848, by Mr. R. W. G. Frith, is now bearing two very large fruit; three fruit set on the tree, but the wind shook one of them off before it had reached maturity. This I also now forward. The peach trees under cultivation in the garden have set a fair crop of fruit this season, and the pumplenoses of sorts, limes, and lemon trees are at present in full flower; but the mango and lichee trees, as usual, show no sign of producing any thing like a crop. The Vanilla plants are showing well for a good crop of fruit, and the *Avocado* pear trees are setting a fine crop of fruit.

"The seed on the American Sumac trees is at present ripening, and being gathered daily.

"In conclusion, I have to state that the whole of the fig-tree cuttings received from Mr. J. Carter, in January last, are dead."

From the statement furnished by Mr. McMurray, with the above report, it appears that of the ten kinds of grass seeds received from the Botanic Garden, Edinburgh, only one had failed to germinate, whilst only nine out of twenty-three kinds received from Messrs. Lawson and Sons, had germinated.

A satisfactory report from the Gardener of the condition of receipt of the bell glasses, cast iron labels, and galvanized wire fence, procured by the Secretary, when in England, for the use of the Society's Garden, was also·

submitted. Of 235 glasses only three had been broken, and eight labels out of 1734.

It was agreed, on the recommendation of the Council, to adopt the suggestion contained in the last monthly report of the Gardener, of obtaining a supply of the Chinese wax-insect; and a communication was accordingly directed to be made to Mr. Fortune on the subject.

In accordance with the resolution passed at the last meeting, the first monthly report of the Schoolmaster on the progress of the school at the Society's Garden, was likewise submitted.

Flax Cultivation in the Punjab.

Read a letter from the Secretary of the Calcutta Chamber of Commerce, submitting for the information of the Society, copy of a letter from the Government of India on the subject of the cultivation of flax in the Punjab, and adding that the Committee of the Chamber has recommended Government to send the entire crop to Bombay as the only place where it is likely to find a market, as the expence of transit from Lahore to Calcutta, would be enormous, especially of the seed.

The following is the letter alluded to: –

To the Bengal Chamber of Commerce.

Dated Fort William, the 9th February, 1855.

Foreign Department.

Gentlemen,—I am directed by the Most Noble the Governor-General in Council to inform you, that on a representation made last year by the Agricultural Society of the Punjab, through the Chief Commissioner, the Government of India, with a view to encourage the cultivation of flax in the Punjab, and its use as an article of export, sent to England for seed and implements, authorised the offer of rewards for breadth of cultivation, and sanctioned the purchase of the entire crop of 1854-55, if of a proper quality, both seed and fibre.

2nd.—The adoption of these measures has been attended with unlooked-for success, and from the returns recently furnished to the Chief Commissioner, it appears that 68,570 beegahs have been brought under flax cultivation, and that the produce available for export (the local demand being trifling) may amount to 2,38,000 maunds of seed, and 68,000 maunds of fibre, the whole of which will be in the market by April.

3rd.—This result, highly gratifying in itself, as showing the productive power of the Punjab, and affording the means of supplying the foreign trade with articles now in unusual demand, has so far exceeded the expectations of the Government, that the Governor-General in Council, would be glad to deviate so far from his original intention, as to avoid the shipment and exportation of so large a quantity of merchandise on account of the East India Company, and he is desirous, therefore, that the actual state of things should be generally known, so that private speculators may either at once enter the market, and take the seed and fibre from the producers, or make arrangements for purchasing them from the Government at Lahore, where the produce purchased by Government will be sent, in order that the fibre may be prepared for the foreign market under European superintendence.

4th.—*The Governor-General in Council desires me therefore to request,* that the Chamber will assist the Government by making known to the mercantile community the prospects of the flax crop in the Punjab, and by giving its advice as to the best means that may be available for bringing the produce to a local market, so as to obviate the necessity for Government interference in transporting it to the coast, and shipping it for the London market.

5th.—It is the intention of the Government to furnish seed and implements for the flax cultivation of the ensuing year, and also to continue the rewards for breadth of cultivation, but the renewal of the promise to purchase the crop of 1855-56, or any part of it, must depend upon the extent to which local purchasers are now found to come forward, and to which encouragement of this nature is otherwise deemed beneficial to the healthy development of the trade.

6th.—As the time is short, the Governor-General in Council would request the early attention of the Chamber to this important subject.

(Signed,) CECIL BEADON,
Secy. to the Govt. of India.

Communications on various subjects.

The following letters were likewise submitted :—

1. From A. W. Russell, Esq., Under-Secretary to the Government of Bengal, forwarding, for the information of the Society, a letter from the Secretary to the Central Committee of Art and Industry for Bengal, regarding the surplus specimens of natural productions, which are not required for the Paris Exhibition of 1855 ; and to state that the Lieutenant-Governor approves of the Committee's suggestions relative to their disposal to certain local scientific Societies.

2. From Captain D. L. Richardson, submitting a copy of the *Literary Gazette* of 17th of February, 1855, which contains an article on flowers, dedicated to the Society.

3. From Messrs. Peter Lawson and Sons, Edinburgh, 18th January, advising despatch of a consignment of vegetable seeds per *Royal Family*, being half the quantity ordered by the Society ; the second half to be forwarded in the following month.

4. From Mr. James Carter, London, dated 16th January, advising despatch by the overland mail, of a small supply of seeds of fruit trees, and of ornamental trees and shrubs.

5. From the same, enclosing his account current for seeds supplied during the season 1854-55, showing a balance against the Society of £280-12.

6. From Messrs. Grindlay and Co., enclosing their account current, with the Society, shewing a balance in their favour of £4-3-6.

7. From Messrs. Smith, Elder and Co., London, dated 19th January, enclosing their account current for books supplied, shewing a balance in favor of the Society of £23-1-3.

(Saturday, the 14th April, 1855.)

C. R. Prinsep, Esq., President, in the chair.

The proceedings of the last general meeting were read and confirmed.

The following gentlemen, who were proposed at the last meeting, were duly elected Members :—

Messrs W. Becher, T. J. Sarkies, G. J. Christian, C. H. Lushington, C. Beadon, T. G. Swinden, Capt. Roderick Robertson, and Lieut. H. M. Garstin.

The names of the following gentlemen were submitted as desirous of joining the Society :—

Alfred H. Cheek, Esq., Civil Surgeon, Benares,—proposed by the Secretary, seconded by Mr. S. Douglas.

Robert Stuart, Esq., M. D., Calcutta,—proposed by Mr. W. G. Rose, seconded by the Secretary.

H. D. Willock, Esq., Civil Service, Muttra,—proposed by Mr. Charles Gubbins, seconded by Dr. Strong.

Capt. C. M. FitzGerald, Assistant Commissary General, Sealkote,—proposed by Major W. H. Lomer, seconded by Major H. Spottiswoode.

W. Theobald, Esq., Barrister-at-Law, Calcutta,—proposed by Mr. Rose, seconded by Mr. C. A. Cantor.

Raphael Solano, Esq., Bulleea Factory *viâ* Dearee,—proposed by Mr. Rose, seconded by Mr. Cantor.

Dr. George Burn Oman,—proposed by Mr. Rose, seconded by Mr. Cantor.

Capt. F. M. H. Burlton, Gwalior Contingent,— proposed by Major E. G. Champneys, seconded by the Secretary.

H. Graham, Esq., Superintending Surgeon, Saugor,—proposed by the Secretary, seconded by Mr. Prinsep.

Rowland Hamilton, Esq., Calcutta,—proposed by Mr. Douglas, seconded by Mr. Cantor.

Presentations.

The following contributions were announced :—

1. Selections from the Records of the Government of Bengal, No. 15, Papers of 1853 and 1854 on the Damoodah Embankments. *Presented by the Government of Bengal.*

2. Journal of the Indian Archipelago, Nos. 7 to 9 of Vol. VIII. *Presented by the Government of Bengal.*

3. Simple Lessons on Plänts, translated into Bengali, with adaptations from the English; and on Agricultural Science as a branch of Native Education. *Presented by the Rev. J. Long.*

4. Transactions of the Massachusetts Horticultural Society, No. 3, Vol I. *Presented by Dr. Falconer.*

5. Journal of the Asiatic Society of Bengal, No. 1, 1855. *Presented by the Society.*

6. A small box of five sorts of seeds from China. *Presented by R. Fortune, Esq.*

"The seeds of the 'Amoy Pummelow' and 'Ningpo Lemon,' are," writes Mr. Fortune, "well worth the attention of the Society. The *Photinia* and *Juniperus sphærica* are both beautiful trees from the Province of Chekiang, and will no doubt thrive well in the temperate hilly districts of India. The hemp palm has been sent to you several times before, but you cannot have too much of this useful tree."

The Secretary announced that he had transferred a portion of the above seeds to the Society's Gardener, and that the remainder was available to Members.

7. Specimens of extract from the seeds and bark of the wild and cultivated "Green Indigo" plant of China, and of paper dyed by seeds. *Presented by R. Fortune, Esq.*

8. Specimens of "Rheea" fibre *(Bœhmeria nivea)* raised and prepared in the Bogra district. *Presented by J. W. Payter, Esq.*

Mr. Payter states that the quantity sent of this "Rheea" (or as it is called in the Bogra and Dinagepoor districts, "khoond"), "was the produce of 8 cottahs of ground that had only two months previous been transplanted from where it was first planted in more congenial sandy soil. It was replanted in a made soil done exactly in the same manner as the mulberry cultivation succeeds, viz., by trenches dug, and the extra soil thrown up, and manure and good soil further mixed with it." Mr. Payter mentioned he was absent when it was cut, but in a subsequent letter will give a detail of the process of preparing the fibre, &c., &c., Mr. Payter adds "should any member require the 'khoond' plants I shall be happy to supply about a thousand, but the river Jumoonah will not be available for boats till the middle of June."

9. A small sample of the fibre of the "bayndee" or "dheroos" *(Hibiscus esculentus)* prepared after his own process. *Presented by Dr. R. Riddell.*

Resolved—That the specimens of paper manufactured from the above fibre, and which were presented by Dr. Riddell, at the last meeting, be forwarded to Dr. Royle, and to the Society of Arts of London, together with the specimens of the fibre also received from Dr. Riddell.

10. Three maunds of Californian Potatoes. *Presented by Capt. Lincoln, of the "John Mayo," through Mr. R. J. Hollingsworth.*

The Secretary intimated that with the exception of five seers reserved for trial in the Society's Garden, the whole of this contribution had been forwarded to Mr. C. K. Hudson at Cherra, and that about 3½ maunds of the same description of potato had been previously sent to the same gentleman.

11. A collection of *Coniferous* and other Himalayan seeds. *Presented by Dr. Jameson, Superintendent H. C. Botanic Garden, Saharunpore.*

12. One maund and eighteen seers of arrowroot powder; twenty-four seers of tapioca powder; 150 pods of *Vanilla aromatica;* and another sample of cotton raised from seed obtained from Mr. Seabrooke's plantation in Eddesto Island, Charleston, S. Carolina: all the produce of the Society's Garden.

It was agreed that this muster of cotton, as also that which was submitted at the meeting in September, 1854, (both being the produce of the same plants,) should be forwarded to Mr. Bazley, the President of the Manchester Chamber of Commerce, he having offered, through the Secretary, to obtain for the Society reports from the best judges of the article on any muster of cotton, the growth of India, that they might be desirous of testing. It was further agreed to send portions of the vanilla to the principal confectioners of this city for a comparative report, with the South American produce. The tapioca, and arrowroot powder is available to Members.

The following articles, which were procured by the Secretary when in England and Scotland, were likewise placed on the table :—

A. Specimens of flax straw, raised from Riga seed, in the vicinity of Wishaw factory near Glasgow; and of flax prepared from the same at the factory, by Watt's patent process. This flax is valued at from £80 to £90 per ton.

B. Specimens of flax straw, raised from Riga seed in the vicinity of Redford factory, Fifeshire; and of flax, prepared from the same at that factory, by Schench's patent process. This flax is valued at from £70 to £75 per ton.

C. Sundry specimens of Riga, Archangel and Russian Slanitz flax, hackled and unhackled, received from Robert Buist, Esq. of Dundee. These are the kinds of flax more largely consumed at Dundee, varying, under ordinary circumstances, at from £25 to £35 per ton, but at present from £25 to £50 per ton. They are now submitted as tests for Indian grown flax.

D. Specimens of "China grass" in state of flax, unhackled and hackled; also specimens of thread prepared from the same, bleached and unbleached. Received from Messrs. Marshall and Co. of Leeds. These are submitted as tests for the "[illegible] [illegible] of Assam, which, if not identical with the "China grass," is equally valuable for all practical purposes.

F. Specimens of cotton raised at Melbourne from Sea Island Seed; and of imported American Sea Island cotton. These were received from Thomas Bazley, Esq., of Manchester, who valued the former at 2*s.* 6*d.*, and the latter at 2*s.* per lb. These are submitted *as tests for cotton raised in India from the same description of seed. The cotton raised in the Society's garden, and alluded to above, is considered by the Society's Committee to be of very nearly* equal quality with the Melbourne *(Australian) cotton, which Mr. Bazley pro*nounced to be a very superior article.

Horti-Floricultural Exhibitions.

The following reports of the Judges on the fourth and last show of the season of vegetables, fruits and flowers, held in the Town Hall, on the 12th April, were read:—

"*Horticultural.*—In submitting the annexed list of prizes amounting to Rs. 210, which were awarded at the exhibition held on the 12th of April, 1855, the Judges desire to offer the following remarks:—

"*First.*—As regards exotic vegetables, it may be noted that asparagus and globe artichokes were well represented, though early in the season for the former. The dwarf French and Lima beans were abundant; a small quantity of long pod bean was also placed on the stands; and a basket of peas in pretty fair condition considering the advanced period of the season. The turnip-rooted and long red beetroot were, as usual at this season of the year, in large quantity, and of good quality. Cabbages of five kinds were well shown, viz: early York, Savoy, Battersea, drumhead, and red; the curled and common Scotch kale were produced in small quantities, but of fair quality. The short horn, Altringham, long red and large yellow carrots were well represented. The red and white seedling celery exhibited on this occasion was, perhaps, better than at any previous show held at the same period of the year. Celery from offsets was also submitted, but of an inferior quality. The curled endive, coss and cabbage lettuces were abundant, well blanched, and of good quality. Leeks and onions were brought forward in abundance, and in different stages of maturity. Four kinds of potatoes were entered for competition, most of them of good description. The turnip-rooted and long red radishes, parsnip, scorzonera squash and water cresses, were tolerably well represented. The white nolekhole, capsicums, tomatoes, and the white and prickly cucumbers were exhibited in abundance and of good quality.

"*Second.*—Of country vegetables, sags, brinjals and beans of several varieties, were brought forward in good condition, besides a number of other esculents.

"*Third.*—In the fruit department, a few baskets of ripe peaches were brought forward very early in the season. Large and small bêls were submitted.

guavas of three sorts, limes, lemons, plantains, pine-apples, papias and pomegranates were shown, as also several baskets of large green mangoes. Loquats and sapotas were of good quality. Strawberries were brought forward in small quantities. Rose apples and pumplenoses, with a few fruits of inferior kinds, were likewise submitted.

"The display was, altogether, a gratifying one. The competition, too, was spirited ; about 60 gardeners entered the list, and prizes were awarded to 40.

W. G. Rose.
Peary Chand Mittra.
St. Douglas.
Joseph Agabeg."

Floricultural.—"The Judges have to report that, though some well grown plants, and a few novelties were exhibited, the show was, altogether, an indifferent one, and the competition not so great as at the April show of 1854.

"Among choice perennial plants may be enumerated, *Amherstia nobilis* from the garden of Mr. Ricketts ; *Ixora Javanica* from Mr. F. Pereira ; *Begonia semperflorens* and *Azalea Indica,* from the Society's Garden ; *Catesbæa spinosa* and *Hoya bella,* from Mr. B. Warwick. With other ornamental, though more common plants, came a few well grown specimens of *Lemonia spectabilis,* contributed by Mr. R. F. Ross ; *Erythrina Crista-galli,* by Mr. Andrew D'Cruz, junior ; *Epiphyllam Hookeri* and *Franciscea uniflora,* by Mr. James Church ; and *Jacquinia ruscifolia,* by Mr. L. Balfour. The display of Orchids was altogether limited : eleven sorts were submitted by Mr. Warwick, including *Ærides citrina, Phaius albus* and '*Ornithochilus nebulosus ;*' eight sorts by Mr. Pereira, among them *Renanthera coccinea* from China. A most lovely specimen of the 'Queen of the Orchids', *Phalænopsis amabilis,* from the Botanic Garden, was also exhibited.

"A few nice grown plants of *Gloxinias* were likewise contributed from the Society's garden, and by Messrs. Church and D'Cru

"Of about fifteen contributors to the show, ten obtained prizes to the amount of Rs. 67, which were distributed, according to the list annexed, by W. G. Rose, Esq., Vice-President.

A. Grote.
J. Scott Elliot.
Benj. Warwick."

Nursery Garden :—School for Gardeners.

The Gardener's monthly report was next read, of which the following is an extract :—

"In submitting my report for March, I have now the pleasure to annex a tabular statement of the pea crop raised in the garden, during the latter end of last year and the beginning of the present, from which it will be observed that the result of the Cape pea sowing has yielded a satisfactory

percentage, whereas the return from the American pea seed has not been favourable; *one maund eighteen seers of Cape stock yielded nine maunds thirty-four seers, and twenty-two seers of American stock yielded two* maunds fourteen seers.

"The tapioca and arrow-root powder prepared this season, and now submitted, will, I trust, bear a favourable comparison with the produce of former seasons. The (150) one hundred and fifty vanilla fruit pods raised in the garden last season from two plants merely, will show to the members of the Society, what may be the probable result of a more extended cultivation of this valuable plant in Bengal.

"The red potatoes now transmitted are a portion of the produce of eight California potatoes presented to the Society by Mr. Ladd on the 13th, and planted out on the 14th December last, and the sample of white potatoes also forwarded are the produce of the potatoes, in which the vine and fig tree cuttings were stuck in, with the view of preserving their vitality during the transit from England to this country, and were planted out in the open ground on the 18th January. I may here observe that no artificial watering has been applied to assist the growth of these potatoes, but that they were cultivated in the usual English way.

"The Rev. Dr. Boaz's presentation of nine New South Wales vine plants, were received on the 31st instant in good health. Mr. A. H. Blechynden's contribution of four verbena plants of two good kinds were received on the 31st in good condition."

The following Report from the Garden Committee of a Meeting held on 2nd April, was likewise submitted, in continuation of a former report, regarding the Garden School, suggesting measures for rendering it as useful as circumstances will permit; with a circular stating the objects of the institution, and inviting the co-operation of Members and others in the country in sending orphan boys to the school, the Society undertaking to provide board and lodging, on the understanding that they agree to bind themselves as apprentices.

"The meeting was held for the purpose of reconsidering the 5th paragraph of the former Report of the 8th August, 1854, respecting the school at the Society's Garden, which runs as follows:—

"And, lastly, they recommend that all boys admitted in future be bound as apprentices to the Society's Head Gardener for a term of five years under Government Regulation XIX of 1851, and that the plan now proposed be considered as an experiment, to be extended if the result proves successful."

The Members having given the subject due consideration, are of opinion that the term of five years requires modification, and they now beg to report:—

1*st.*—That a term of five years be the term for boys entering the school at the age of ten.

2nd.—That boys of twelve years old be apprenticed for three years.

"*The Committee also recommend that a circular, in English, Bengali, and Oordoo, according to the annexed form, be issued.*

The above will not increase the monthly expense of Rs. 58 already sanctioned by the Society.

"The Committee consider it desirable that a steady person should be appointed at monthly wages of from 8 to 10 Rs., to look after the boys during the hours when they are not engaged in learning and working."

The following is the Circular referred to :—

"The Agricultural and Horticultural Society have long felt it was necessary not only to encourage the growth of new and useful plants in this country, but also to have native gardeners competent to take charge of them.

"The efforts of the Society to improve the present class of *malis* by offering prizes have been successful in Calcutta and its neighbourhood.

"A knowledge of horticulture is spreading through the country, but constant complaints are being made of the loss of valuable plants and of fruitless expences incurred, because the *malis* have not received a practical training under an experienced gardener, and are unacquainted with either the improved theory or the practice of successful gardening.

"To meet this want the Society have established a school in their garden. The boys, under the superintendence of their Head Gardener, Mr. McMurray, work in the garden morning and evening, so as to get practically acquainted with all the branches of practical gardening, and with the various experiments that are from time to time carried on with plants.

"In the day time they study in the school under the native teachers writing, reading, arithmetic, mensuration, geography, and the elements of botany, so as to become intelligent gardeners.

"As the object of the Society is to provide for their Mofussil friends a superior class of Horticulturists, they solicit their co operation, and particularly in sending them youths of about twelve years of age, who might be apprenticed for three years to learn gardening, and then return to be engaged in their former locality or elsewhere.

"The Society undertakes to defray all the expences connected with the education and board of these apprentices."

Moved by Mr. Grote, seconded by Baboo Peary Chand Mittra, and *resolved* that the Report of the Garden Committee, which has been recommended by the Council, be adopted ; and that the Circular in question be issued in English, Bengali and Oordoo.

Indian Agricultural Miscellany.

Read the following Report of the Translation Committee, submitted through the Council :—

"The Translation Committee beg to intimate the receipt of 550 copies of Part V, of Vol. I, of the 'Indian Agricultural Miscellany.'

"In a former report, dated 23rd December, 1853, the Committee recommended the sale of the work at two annas a copy, instead of a gratuitous distribution; to be raised to four annas (the cost price) if it met with a ready sale. In a subsequent report they recommended a reprint of the first part of the first volume, and its sale at two annas a copy, (the cost price.) The Council, however, suggested as an amendment, which was adopted at the General Meeting in August, 1854, that this reprint, as also all other numbers, be sold at four annas a copy. Since then the sale has been so very limited, that the Committee take this opportunity of strongly recommending again to the Society, through the Council, a return to the former rate of two annas; and that in the event of any person buying a large number of copies, say fifty, a discount of ten per cent. should be allowed for cash payment. Further, that a reference be made to the native Members of the Society, who are zemindars and planters, whether they require any, and what number of copies.

"As little or no benefit appears to have been derived from advertising the work in the Bengali Newspapers, the Committee recommend its discontinuance: they however, suggest that a copy of the number just issued, as also all subsequent numbers, be sent to the papers for the purpose of being noticed in their editorial columns.

"As no reply has as yet been received from the Government regarding the recommendation contained in their last report, viz. 'that a copy of each of the numbers published be sent to the Government of Bengal with a request to know if it requires any number of copies for the Vernacular Schools and the Libraries at Sudder Stations in progress of promotion,' the Committee suggest that a second communication be made to the Government of Bengal on the subject.

PEARY CHAND MITTRA.
PERTAUP CHUNDER SINGH.
HOREEMOHUN SEN."

Resolved—That the Report of the Committee be adopted.

Vegetable Fibres.

A Report was submitted from Mr. Joseph Willis, a Member of the Hemp and Flax Committee, on sundry specimens of fibre from the aloe, plantain, pine-apple, dheroos, yucca, &c., which were presented by Dr. R. Riddell, at the meeting in October 1854;* on a specimen of fibre received at the same time from Col. Hannyngton, being the produce of China seed, obtained from Mr. Fortune; and on a muster of flax raised at Azimghur, and presented by Mr. Sturmer, at the meeting in August, 1854. Mr. Willis pronounces the flax specimen to be 'very ill grown, being very short, scarcely above a foot in length. The fibre is also coarse, and very uneven; harsh, foul, and bad in colour and actually dirty. It must be almost worthless to the regular flax specimen or manufacturer. It would sell only at a very low price for the commonest purposes, and perhaps is most suited for pulping for paper. Of Col. Hannyngton's specimen, raised at Chota Nagpore, Mr. Willis remarks:—

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* For this report, see Part I, page 119.

"This fibre and seed appears to me on examination to be from the plant, which is common in Bengal, *Corchorus capsularis.* This specimen of fibre is about 3 or 4 feet long; being inferior in length to the plant when under cultivation in Bengal; but it is fine and strong, although very insufficiently freed from its bark or skin. It is one of the many fibrous plants of this country deserving that attention of cultivators and merchants which has not yet been bestowed on it."

Ordered—That copies of the above reports be sent to Dr. Riddell, Col. Hannyngton, and Mr. Sturmer.

Recommendations from the Council.

The following recommendations from the Council were next brought to the notice of the meeting:—

First.—"That a special vote of thanks be accorded to Dr. Falconer, late Superintendent H. C. Botanic Garden, Calcutta, for services rendered to this Society."

The following was moved as an amendment by Baboo Peary Chand Mittra, seconded by Mr. Cantor, and carried unanimously:—

"That a special vote of thanks be accorded to Dr. Falconer, late Superintendent H. C. Botanic Garden, Calcutta, for the interest he has taken in the affairs of the Society, and for services rendered to it."

Second.—"That Mr. Joseph Agabeg, be requested to join the Garden Committee, in whose proceedings he has always evinced a lively interest."—Carried unanimously.

The Council also submitted, with a recommendation for its publication in the number of the Journal now in the press, a communication from the Secretary on certain subjects to which his attention had been directed during his brief residence in England; together with an Analytical Index to the Transactions and Journals of the Society:—whereupon it was moved by the President, seconded by Mr. Grote, and carried unanimously:—"That the best thanks of the Society be given to our Secretary for his great zeal and diligence in compiling, during his outward and return voyage, the very full and valuable Index to our Transactions and Journal for the last 25 years, now presented to the Society; as well as for the communication now presented by him, the result of personal inspection and inquiries, respecting the cultivation of flax in Great Britain and Ireland, and its after preparation under certain recent improved processes, and according to the old system; as also for information obtained on various other subjects, in which our Society is deeply interested."

The Green Indigo of China.

A communication from Mr. Fortune, dated Hong-Kong, March 19, on the above subject. *(See Part I, Vol. IX., p. 205.)*

Resolved—That the specimens sent by Mr. Fortune be transferred, in the first instance to Dr. Macnamara, with the request of the Society for his opinion on them, and afterwards forwarded to M. Persoz, and that the best thanks of the Society be given to Mr. Fortune for the trouble he has taken in meeting its wishes.

Miscellaneous subjects.

The following letters were likewise submitted :—

1. From C. Gubbins, Esq., dated 12th March, promising, in compliance with the suggestion of the Secretary, to send a quantity of flax-straw, raised at Allyghur to the Society for despatch to the Chamber of Commerce at Dundee, who have promised to prepare by recent improved processes any quantity of Indian-grown flax straw that may be sent to them, and to communicate the result to the Society. Mr. Gubbins writes : "I have just plucked linseed, sown in a piece of ground measuring $2\frac{1}{5}$ of an acre : the seed has not been allowed to ripen, the plant is just beginning to turn color, but is still green, it varies in height from 20 to 36 inches, and averages 27 inches, and the whole produce weighs 590 lbs. It will now be carefully dried. The seed was sown much closer than in usual in this country, as it is here only cultivated for its seed."

Resolved—That the necessary expence be incurred for sending this flax straw to Dundee.

2. From Dr. Campbell, Darjeeling, reporting the failure of the varieties of rice sent to the Society by Mr. Fortune, in March, 1854.

3. From the same, intimating, in reply to an enquiry from the Secretary, that he can obtain 30 maunds of good potatoes for the Society at Rs. 3-8 per maund, independently of the carriage and boat hire, "if it is not too late in the season," observes Dr. Campbell. "I should think it highly desirable to send them to Cherra. They are the best procurable here. The *Californians* I had last year from the Society, and from Dr. Falconer, did not turn out well at all—not at all equal in size to the seed."

Resolved—With reference to the quantity recently sent to Cherra of the Californian potatoes, and to a supply expected from Madras, Dr. Campbell be written to for ten maunds only of the Darjeeling stock, to be forwarded on arrival to Mr. Hudson.

4. From Captain G. E. Hollings, Shahpore, Punjab, reporting on the trial of the Seychelles cotton seed, received from the Society in February, 1854. "The seed germinated very freely"—writes Captain Hollings,—"and

the shrubs attained a good height, and there was abundance of blossom, so that to the last moment the promise was good; but as the cold weather progressed, the bolls shrunk and withered, and the frosts completely destroyed all my hopes. I had the shrubs cut down to the ground, and the earth well turned and manured round the roots; the new shoots are now appearing. The failure is to be attributed, in the first instance, to the seed not having reached me till the sowing time was over, and secondly the shoots were not stopped soon enough, which caused too rapid a formation of stalk, which was thin and lanky. I dare say, we shall meet with better success this year. I take advantage of this opportunity to mention an instance of the rapid growth of fruit trees in this part of the Punjab. On my first arrival at this station in January, 1853, I sowed some almond stones. The trees were in blossom this year."

5. From John Clough, Esq., London, dated 31st January,—giving some useful information on the subject of Indian flax and tallow.

6. From Mr. George Knight, Jubbulpore, stating that he is about to prepare a small quantity of flax for exportation, and asking for test samples of European flax.

The Secretary mentioned that he had sent Mr. Knight small portions of the flax he had brought from England, and had asked him for some particulars regarding his experiment.

7. From Messrs. Augustin Wills, and Co., acknowledging receipt of the Gold Medals voted by the Society in 1853, to Messrs. Bates, Hyde and Co., and Messrs. Carver and Co., of Massachusetts, and promising to forward them to their respective addresses.

(*Saturday, the* 12*th May,* 1855.)

Baboo Gobindchunder Sen, Vice-President, in the Chair.

The proceedings of the last general meeting were read and confirmed.

The following gentlemen, proposed at the last meeting, were duly elected Members:—

Dr. A. H. Cheek, Dr. Robert Stuart, Capt. C. M. Fitzgerald, Messrs. H. D. Willock, C. S., W. Theobald, R. Solano, and Rowland Hamilton, Dr. G. B. Oman, Capt. F. M. H. Burlton, and Dr. H. Graham.

The names of the following gentlemen were read as candidates for election:—

Thomas Thomson, Esq., M. D., Superintendent H. C. Botanic Garden, Calcutta,—proposed by Mr. Arthur Grote, seconded by Mr. C. A. Cantor.

Major George Ramsay, Resident at Nepal,—proposed by Sir James Colvile, seconded by Sir Arthur Buller.

Baboo Shamachurn Law, Calcutta,—proposed by Baboo Peary Chand Mittra, seconded by Baboo Ram Gopal Ghose.

H. C. Levinge, Esq., E. India Railway Department, Bhaugulpore,—proposed by Dr. James Allan, seconded by the Secretary.

Falkner C. Sandes, Esq., Solicitor, Calcutta,—proposed by Mr. J. S. Elliott, seconded by Mr. W. F. Gilmore.

Simon N. Martin, Esq., Civil Service,—proposed by Mr. Grote, seconded by Mr. R. W. G. Frith.

Captain James Murray, 9th Regt. N. I., Mussooree, - proposed by Major L. Percy *D. Eld, seconded by the Secretary.*

Captain E. A. Rowlatt, *Principal Assistant Commissioner of Assam,—proposed by* Colonel *F. Jenkins, seconded by Mr. Joseph Willis.*

Baboo Suproshad Raj Muntree of Cooch Behar,—proposed by Mr. Cantor, seconded by the Secretary.

J. H. Reily, Esq., Deputy-Collector, Backergunge,—proposed by Mr. Robert Morrell, seconded by Mr. W. G. Rose.

Captain C. B. Young, Engineers, Civil Architect, Calcutta,—proposed by Mr. Cantor, seconded by the Secretary.

Presentations.

The following contributions were announced :—

1. Jeffrey's Hints to Amateur Gardeners in Southern India. *Presented by the Author.*

2. List of Bengali Books, useful either for Educational purposes, or for Libraries. *Presented by the Rev. J. Long.*

3. Selections from the Records of the Government of Bengal, Nos. 17 and 19 (2 copies of each.) *Presented by the Government of Bengal.*

4. A small quantity of seed of *Pinus longifolia. Presented by W. H. Kerry, Esq.*

5. A quantity (about 2½ maunds) of Sea Island, and Australian cotton seed. *Presented by W. Blundell, Esq., of the firm of Leach, Rawson, and Co.*

Mr. Blundell intimates his intention of transferring to the Society, a much larger quantity of the above seed. He states he has received from England a cotton gin of the same kind as that used by Mr Bazley to separate the seed from the long-stapled cotton, and he will be glad to have its merits tried with whatever cotton may be produced from the seed distributed by the Society from the above supply.

6 A small quantity of tobacco seed, from the Phillippine Islands. *Presented by Francisco Pereira, Esq.*

7, A small collection of Chinese seeds, forwarded by Mr. Fortune. *Presented by A. Grote, Esq.*

8. One hundred and twenty-five bulbs of sorts *(Anaryllis, Crinum, Hippeastrum, double Hemerocallis, Polyanthus, &c.) Presented by R. F. Ross, Esq.*

9. A small box of cochineal, reared at Soojimpore factory, Nuddea. *Forwarded by M. Durup de Dombal, Esq.*

Mr. Dombal wishes to know if this be the real kind for commercial purposes, as also the process for extracting the dye.

The Secretary stated he had given Mr. Dombal the required information; the Cochineal is the wild kind,—*Grana sylvestris.*

10. A sample of fibre prepared from *Hibiscus Africanus. Presented by James Cowell, Esq.*

The following is extract of Mr. Cowell's note on the subject: "Ten or twelve years ago I got from you (among other English flower seeds,) some of the *Hibiscus Africanus,* which grows freely in England. This plant throws its seeds about my garden yearly, and in the month of April, after a good shower of rain, the young plants come up spontaneously and vigorously. Last year (September,) I cut down several of the plants and steeped them, and got about a maund of fibre. The accompanying is a specimen, but a very poor one, as you will observe, being short and weak and of a bad colour."

A bundle of flax straw was also placed on the table, being specimen of a bale sent from Allyghur, by C. Gubbins, Esq., for transmission to the Chamber of Commerce at Dundee.

Reports.

The Gardener's monthly report, was read, of which the following is an extract:—

"In drawing up my report for the month of April, I have first to notice the packet containing nine kinds of English fruit seeds presented to the Society by the Hon'ble J. Dorin, in January last, and to state that only two of the sorts have germinated up to the present time, viz.: black currant and red raspberry.

"Four out of the six kinds of China seed, received from Mr. Fortune, in February last, have come up very freely, viz.: *Cryptomeria Japonica, Chamærops species,* and the wild and cultivated green dye plants. The green dye plants raised from seed supplied by Mr. Fortune last year turns out a deciduous shrub, and apparently from the wood and buds belongs to the "*Rosaceæ.*" These plants have already made a good growth this season, but up to the present time show no signs of flowering. Of the thirty-four kinds of fruit and shrub seeds received from Mr. J. Carter, of London, in March last, fourteen of the sorts have germinated pretty freely.

"The *Raphostemma pulcherrima* seed, presented to the Society by B. Warwick, Esq., on 25th ultimo, have germinated very freely. On the 20th April, a strong gust of wind blew down one of the two fine specimens of *Poinciana Regia* trees at the east side of the pucka conservatory: the main roots of this tree were all decayed. Also one of the imported American peach trees, was blown down on the same date, and by the same cause, the roots being rotten. The storm of the 25th ultimo, did little damage to the trees, but blew off nearly all the fruit then in a green state. The Californian potato seed, presented to the Society, by Captain Lincoln, in April, a portion of which was sent to the garden for trial, sprouted freely after planting out in the ground, but has since been destroyed by the rain and heat, which first saturated the ground with water and then burned the young plant by heat and moisture."

The schoolmaster's report of the progress of the boys at the garden school was submitted.

A report from the Cotton committee was read on various musters of cotton raised at Bolaram in the Deccan, and at Buttala in the Punjab, by Dr. Riddell, and Mr. J. H. Prinsep, and presented at the general meeting in March. All are described as ordinary descriptions, with exception of one of the kinds sent by Dr. Riddell, which he states, was raised from seed brought originally from Mauritius. This cotton is pronounced to be a very superior article, and would no doubt fetch a long price in Liverpool, as much as 1*s.* 9*d.* to 2*s.* per ℔.; it has probably been raised from Bourbon or black seed variety.

Reports were likewise submitted from the Flax and Hemp Committee on musters of bast and jute forwarded from Arracan, by Lieut. Ripley; on a nettle from Darjeeling, by Dr. Withecombe; and on the fibre of *Sida rhomboidea* raised in the Society's garden.

Ordered—That copies of the above reports be sent to Drs. Riddell and Withecombe, Mr. Prinsep, and Lieut. Ripley.

Flax seed for distribution.

A recommendation was brought up from the Council on the subject of flax seed. The Council recommend that with the view of meeting the wish expressed in various quarters for the culture of flax for the sake of the fibre, the Society obtain small supplies for distribution during the next season, namely, about 20 bushels of acclimated *Riga* seed from Messrs. Lawson and Son, of Edinburgh; a quantity of the white seed of the Nurbudda; of good country seed either from Tirhoot or Patna, and of seed from Saharunpore; an application to be made for the latter to Dr. Jameson, Superintendent Botanical Gardens, N. W. Provinces.

Another recommendation was submitted by the Council, that as only half the usual quantity of American vegetable seeds has been ordered for this season,—so not admitting of a general distribution,—they be sold to members at cost price, and to non-members at 50 per cent. additional price. The consignments of vegetable seeds from Edinburgh and the Cape, and of flower seeds from England, will, as usual, be distributed *gratis* to members.

Resolved—That the recommendations of the Council be adopted.

A recommendation from the Garden Committee (supported by the Council) was submitted, for an increase of pay to certain members of the establishment, to the extent of Rs. 4 per mensem. An application was read from Bhobany Churn Bose, second writer in the Secretary's office, for an increase of pay, together with a recommendation from the Council to raise his salary from

Rs. 13 to Rs. 20 per mensem, in acknowledgement of his industry and general intelligence; whereupon the following notice of motion was given by Baboo Peary Chand Mittra; "that the recommendations of the Council respecting the garden establishment and Bhobany Churn Bose, be brought forward at the next general meeting for confirmation."

Communications on various subjects.

The following letters were read :—

1. From Lieut.-Colonel Jenkins, Gowhatti, dated 1st May, in continuation of former communications respecting the deterioration of the potato crops in the Cossyah Hills, and the supplying of the hill people with seeds of certain useful esculents. The following is extract of Colonel Jenkins' letter :—

"I have now to thank you and Mr. Robinson, for your attention to my recommendation to send fresh potato seed to the Cossiahs. I see by your last report, which I have just received, that a large quantity of seed has been sent for Cherra, by Dr. Campbell, and I am much obliged to him for them. Since I wrote to the Society about the Cossiah potatoes, I have paid a visit to Cherra, and I was well pleased with my trip. Mr. Hudson told me that of the supply of California potatoes, one-half were rotted before they reached him from being badly packed (thrown in bulk, not in layers, in straw or sand) but of the worst, the Cossiahs picked out the eyes of all likely to vegetate, and he believed most were growing. Of the rest he planted some in his own garden, which I saw, and they looked thriving, and the rest were distributed in different localities. The Cossiahs were very eager to get them, and would be glad to get any quantity which should reach them in the beginning of March, or at farthest before the end of the month, and I will be obliged by your making a note of this against next season. I saw the Cossiahs busy planting at all the villages I passed, throughout the month of March, and I was much pleased with the care with which they are planted, especially at Miflung, where all the fields are surrounded with good hedges, the lower part of which is about two and a half or three feet, are carefully built up with stone, on which is planted bushes either dry or living, and the fences altogether are very good. Miflung is very elevated, and extremely cold, and I should think these hedges would be very beneficial not only against cattle, but in protecting the plants against the very bleak winds there prevailing. The khets are very carefully prepared for the roots, by burning all the surface sods in heaps, and drained carefully at intervals. The cultivation at Miflung was very considerable, but the extent of similar lands round about still lying waste was very great, very many times of greater area than the cultivated, but these seemed to bear a good proportion to the population, which is exceedingly scanty, and one-half the labour of the people is exhausted in carrying the produce of the hills on their own backs, instead of using cattle or mules, and the introduction of either would have about the same effect as railways in Bengal. The Cossiahs import all their potatoes nearly, and as they have only very scanty crops of rice, millet, kachoos, and a few other products, I imagine they are often but badly supplied with food. I was thinking that the introduction of turnips, mangold-wurzel, carrots, beet root, and cabbages, caravensera beans of all kinds, would be a very great boon to these poor hill men, and if the Society would send some seeds of each to Mr. Hudson, I am sure that gentleman would do his best to introduce them. Of course I do not allude to such sample parcels as we get from the Society. What is wanted for them are such seeds as are sown for cattle at home, and sold by the bushel, and of which, I fancy, the Society might procure large quantities at a very trifling cost. The Cossiahs would not perhaps take at once to the cultivation of new crops largely, but if seeds were placed at their disposal a few years in succession, I have no doubt new plants would be gradually established. This was the case with the potatoes; their progress with it at first was very slow, but it is now thriving every where, and the exports, I have little doubt, exceed a lakh of Rupees' worth, besides what is consumed in the Hills. The Cossiahs appear to be very industrious and willing to learn and to introduce any new products, but they sadly want a few planters with a little capital to provide them with fruit trees, roots and vegetables which they have not, or know not how to cultivate. About their villages (and the interior of the hills) they appear to have no fruit trees whatever, but there are no plums, apples, pears that would thrive every where. At Mungklow there were two or three pear trees, introduced by Mr. Scott, and I never saw in my life any where pear trees in such full bloom as they were when I passed in the beginning of March."

Resolved—That the Council be requested to report to the next general meeting as to the best mode of carrying Col. Jenkin's suggestions into effect.

2. From Major James Johnston, Deputy-Commissioner, Southern Division, Berar district, dated 2nd April, applying for cotton and tobacco seeds of sorts. "If the Society can send me some cotton and tobacco seed, I shall feel obliged. I am most anxious to cultivate the same to some extent in the country entrusted to my charge. I shall also feel obliged for any other description of seed the Society may be of opinion ought to be propagated in the late ceded districts."

The Secretary intimated that he was about forwarding by dâk banghy to Major Johnston, a portion of the cotton seed, presented by Mr. Blundell, and tobacco seed from the stock presented by Mr. Pereira, and Lieut. Ripley, and acclimated seed from the Society's garden, for all which he had obtained a free transit from the Supreme Government.

3. From Dr. F. N. Macnamara, returning the specimens of Chinese green dye, which were sent him for examination in accordance with the resolution of the last meeting. Dr. Macnamara writes:—"I see that the Society has determined upon sending the 'China green dye' to M. Persoz for examination, and from the experience which that gentleman has had in the applied chemistry of dyes, and from the ample means with which he is provided for carrying on delicate experiments, I think that any results which I might in

the interim obtain would be comparatively valueless, followed so quickly as they would be by the full report, which M. Persoz's experience in this particular branch of chemistry will doubtless enable him to furnish to the Society. It would be impossible for me to give an opinion upon the dye without subjecting it to a course of experiments which would almost, if not entirely, exhaust the quantity which has been forwarded to me. On this occasion, also, I should be unwilling to forestall M. Persoz, who will require for his examination at least the whole of the dye and its preparations which the Society possess."

Resolved—That the specimens in question be transmitted to M. Persoz, by the first opportunity.

4. From Messrs. J. Spence and Co., and D. Wilson and Co., reporting on the Vanille pods, the produce of the Society's garden, which were submitted at the last meeting. Messrs. Spence and Co. "do not consider it has such a strong flavour as that imparted by the imported Vanille." Messrs. Wilson are of opinion, "that the beans are nearly equal to those produced in (or procured by us from) France. We are of opinion that it might be brought to compete with the foreign produce. We think it not quite so full flavour as the foreign which may probably have arisen from exposure."

5. From Mr. F. Fowler, reporting on the specimen of New Zealand wood presented by Mr. Seymour at the meeting of December last. Mr. Fowler is of opinion that though this wood might be adapted for any thing that did not require to be delicately engraved, yet it is so much inferior to box, that it would not answer as a substitute for it.

6. From C. Gubbins, Esq., Allyghur, expressing his readiness to make an experiment, next season, on a larger scale, in flax culture, if the Society will furnish him with seed.

Resolved—That portions of the seed for which the Society are about to indent be placed at the disposal of Mr. Gubbins.

7. From Messrs. P. Lawson and Son, Edinburgh, advising dispatch per "*Queen of the East*" of the remainder of the consignment of vegetable seeds ordered from them.

8. From Messrs. Grindlay and Co., advising despatch of the Havannah tobacco seed forwarded to their care, by Mr. D. Landreth of Philadelphia.

9. From the Secretary to Government N. W. Provinces, forwarding copy of Meteorological Register kept at his office for the month of March, 1855.

(*Saturday, the* 9*th June,* 1855.)

C. R. Prinsep, Esq., President, in the chair.

The proceedings of the last general meeting were read and confirmed, and the gentlemen proposed on that occasion were duly elected Members, viz. :—

Dr. Thomas Thomson; Major George Ramsay; Baboo Shamachurn Law; Messrs. H. C. Levinge; F. C. Sandes; S. N. Martin; J. H. Reily; Captain James Murray; Captain E. A. Rowlatt; Captain C. B. Young; and Baboo Suproshed Raj Muntree of Cooch Behar.

The names of the following gentlemen were read as candidates for election:—

The Hon'ble H. R. Addington, 74th Regt. N. I., Cawnpore,—proposed by Dr. K. M. Scott, seconded by Mr. C. A. Cantor.

G. M. Jackson, Esq., Silk merchant, Berhampore,—proposed by Mr. H. Deverell, seconded by the Secretary.

John Clarke, Esq., M. D., Calcutta,—proposed by Dr. J. B. Oman, seconded by Mr. W. G. Rose.

H. A. R. Alexander, Esq., C. S., Backergunge,—proposed by Mr. Robert Ince, seconded by the Secretary.

C. J. Wingfield, Esq., C. S., Bijnore,—proposed by the Secretary, seconded by Mr. Prinsep.

T. Bruce Lane, Esq, C. S., Magoorah,—proposed by Mr. Gow Smith, seconded by the Secretary.

H. B. Riddell, Esq., C. S., Director-General of Post Offices,—proposed by Mr. A. Grote, seconded by Mr. Prinsep.

George Dixon, Esq., Burhurwah, Moteharry,—proposed by Mr. Cantor, seconded by the Secretary.

James Slade, Esq., Raugepore factory, Tirhoot,— proposed by Mr. S. P. Griffiths, seconded by Mr. W. Stalkartt.

Captain Davies, Commandant Police Battalion, Boldanah,—proposed by the Secretary, seconded by Mr. Cantor.

Baboo Ramanath Banerjee, Calcutta,—proposed by Mr. Grote, seconded by Mr. Cantor.

J. Stephen, Esq., Dacca,—proposed by Mr. Prinsep, seconded by Mr. Cantor.

Presentations.

The following contributions were announced:—

1. Half-yearly Report of the Chamber of Commerce, May, 1855. *Presented by the Chamber.*

2. Selections from the Records of the Govt. of Bengal, No. 20, (2 copies). *Presented by Government.*

3. Journal of the Asiatic Society of Bengal, No. 2 of 1855. *Presented by the Society.*

4. A descriptive catalogue of Bengali works. *Presented by the Rev. J. Long.*

5. Dried specimens of what is supposed to be the tea plant. *Presented by F. Skipwith, Esq.*

Mr. Skipwith states that "the plants from which these specimens have been gathered, grow luxuriantly in the Cachar district, on the slopes of the hills, and natives who have been employed by the Assam Tea Company, declare them to be precisely similar to the Assam plants." Mr. Skipwith adds that the specimens have been forwarded to him by Captain Verner, the Superintendent of Cachar.

Dr. Thomson, to whom these specimens were referred, states that they are less complete than he could have wished, "but to all appearance they are identical with the tea plant of Assam. The leaves and branchlets certainly exhibit no differences. There are no capsules with the specimens, but five or six loose seeds which closely resemble those of the tea plant. They are, however, empty. On one specimen I found a very young fruit, supported by the persistent calyx. It is distinctly three lobed like that of the tea plant."

The Secretary reported that he had requested Mr. Skipwith to send a more complete set of specimens, to render the examination more perfect.

6. Four samples of tea, grown and manufactured at Munneepore. *Presented by R. Houstoun, Esq.*

Messrs. Agabeg and Cantor were requested to favor the Society with their opinion on these teas.

7. Sample of fibre obtained from a creeper growing in the Midnapore district. *Presented by Mr. J. B. Williams of Jubblepore.*

Mr. Williams considers that if this fibre could be procured cheap, and in large quantities, it would form an admirable substitute for flax.

The Secretary reported this fibre to be identical with that presented by G. F. Cockburn, Esq., in November last, which had also been obtained from a common jungle plant of the Midnapore district, and was most favorably reported on by Mr. Willis and other members of the Committee. Mr. Cockburn had very recently sent a few small living specimens, from which it would appear that the plant is the *Asclepias tenacissima* of Roxburgh, from the fibre of which the mountaineers of Rajmahal make their bow strings on account of its great strength and durability.

8. Sample of Pooah fibre from Darjeeling. *Presented by S. Douglas, Esq., on behalf of Dr. J. R. Withecombe.*

The Secretary intimated that this fibre had been already before the Society, samples having been submitted by Dr. Campbell in 1847. It is the produce of *Bœhmeria frutescens.* The late Captain Thompson reported *most favorably* on it, considering it quite equal to the best European flax, and better fitted for converting into sail cloth than any other substance he had seen in India. Specimens of cloth and line made by Captain Thompson from this fibre were placed on the table.

9. Twenty-four seeds of *Amherstia nobilis. Presented by Mr. R. Dougherty, in charge of the Barrackpore Park.*

The Secretary reported that 16 of these seeds had already germinated in the Society's garden.

10. A packet of seed of the "Prophet's flower" from near Kohat. *Presented by Major F. C. Burnett.*

Major Burnett mentions that this plant produces a most beautiful fragrant flower, color yellow, with a brown spot on the centre of each petal, which disappears in a day or two; it is also known as the "Pyghumber-ke-Phool," or "Russool-ke-Bootta." Major Burnett, suggests, as it is not likely to succeed well in Bengal, that a portion of the seed be sent home to the different good gardens, such as Chiswick, Kew, &c., and to Dr. Royle. Dr. Thomson thinks that the plant in question is a species of *Arnebia.*

The Secretary was requested to carry Major Burnett's recommendation into effect.

11. A small quantity of Surdah melon seed. *Presented by Lieut. Col. W. Swatman.*

Col. S. states that the seed was taken from fruit brought to Peshawur, from either Cabool or Jellalabad.

12. A few seeds of acclimated Maltese Gallipoli cotton. *Presented by H. Piddington, Esq.*

Reports.

The Schoolmaster's monthly report was submitted:—

A report was also submitted from Joseph Willis, Esq., on a muster of fibre from *Abelmoschus esculentus*, which was forwarded from Berhampore, by Captain Layard. Mr. Willis "considers this specimen on the main exceedingly well prepared. It is very clean throughout, very lustrous, and of good silvery white, tending to a drab colour. It is of great length, being 6 or 7 feet. It is of fair, but very moderate strength; resembling in this respect other specimens of this plant which have appeared before the Society. It appears to me impossible, or very difficult, to state a precise value for it, because we are yet but ignorant of its capabilities under the trials of wear and tear and the alternations of moisture and drought. Its most true value remains to be found by the rope and cordage maker, and the spinner and weaver, and especially the user of these manufactures. As well likewise may we perhaps very suitably add, the *fine paper maker*, and for whose purpose it seems to me to possess great value."

The Garden Committee submitted an application from the Head Gardener for sick leave of absence, with a certificate from Dr. Macrae of Mr. McMurray's bad state of health, and a recommendation for a trip to Mauritius.

Resolved—That the necessary leave be granted to Mr. McMurray, and that Mr. Stubbs, who was formerly employed in the Botanic Garden, as acting Head-Gardener, and Overseer, (and who is now recommended by Mr. McMurray), be appointed to officiate during his absence.

The motion of which notice was given at the last meeting by Baboo Peary Chand Mittra,—"that the recommendations of the Council respecting a monthly increase of rupees four for the garden establishment, and an increase of pay from Rs. thirteen to Rs. twenty per mensem to Bhobanee Churn Bose, be brought forward at the next general meeting for confirmation,"—was submitted, seconded by Mr. S. H. Robinson, and carried.

Communications on various subjects.

The following letters were also submitted :—

1. From Dr. R. Riddell, Bolarum, dated 30th May, on the comparative strength of ropes made from the fibres of *Hibiscus esculentus* and *H. cannabinus.* "I have been trying some experiments,"—writes Dr. Riddell,—"with the fibre of the *Hibiscus esculentus* and *cannabinus*, converting it, as far as we were able here, with our imperfect machinery, into rope, and testing its strength by attaching weights to it until it broke. A rope, of the *Hibiscus esculentus*, 3 inches in circumference, broke with 16 cwt. attached; a 4½ inch, which stretched to 3½, from its not being tightly twisted, broke with the weight of 26 cwt. 1 qr. and 26lbs.

Rope made with the H. cannabinus.

		cwt.	lb.
1	inch in circumference broke with	5	70
2	ditto, ...	14	0
3½	ditto stretched to 3 inches, ..	17	3

"The *Hibiscus esculentus* is my old friend the 'Baindie,' and Mr. Willis seems to think, from the sample I first sent, it is more fit for the paper than the rope maker; it strikes me it will answer for both, only prepare the fibre differently. A one inch piece of rope broke with 5 cwt. attached, whilst *H. cannabinus* took 70 pounds more to break a rope of the same circumference and size."

2. From Dr. Thomson, Superintendent H. C. Botanic Garden, announcing that he has a number of young coffee plants, which he will be glad to distribute to any persons who are likely to make a good use of them; also seeds of *Corypha taliera,* a fine fan palm, to any one willing to raise them.

3. From Lieut.-Col. Jenkins, suggesting the importation of potatoes for distribution throughout the country. "I do not see," remarks Col. J., "why the Society should not from time to time import some of the best varieties of the potato, for distribution in different parts of the country, at the same time I think they might do much good by getting good varieties of potatoes transferred from one part of India to the other; but the first step to any general improvement of this most useful fibre is to collect the different varieties from the parts most famous for its culture, and to record the sorts and the effects of removal from one locality to another.

"Few people know perhaps how much the potato is effected by a change of soil and climate, and mode of culture.

"I know that all kinds of potatoes introduced into the Cossyah hills, with the wet climate and heavy clays generally prevailing there, become sooner or later round, white, small and indifferent, and at Sadiya all kinds, in the very light soil of that district, become kidneys.

"I would again beg your attention to the advantage of importing the capsule (seed) of the potato, and trying to raise new kinds in that manner, which appears to be now generally practised at home."

In reference to the concluding part of the above letter, the Secretary suggested that as the potato seed ripens in Great Britain, during August, Messrs. Lawson and Son, be instructed to send out by the overland steamer of September a varied assortment of seeds for distribution in India during the next cold season. Agreed to.

4. From Dr. Campbell, advising the despatch of 10¼ maunds of Darjeeling potatoes.

5. From Jacob Kerakoos, Esq., dated Madras, 7th May, advising despatch of five maunds of Bangalore potatoes.

The Secretary intimated that he had forwarded the above to Mr. Hudson at Cherra. The Bangalore potatoes had reached in tolerably good condition, but one-third of the Darjeeling potatoes had suffered in transit.

6. From R. J. Hollingsworth, Esq., applying for a collection of seeds to send to California and to the Sandwich Islands.

The Secretary stated that Mr. Hollingsworth had materially aided the Society in obtaining supplies of California potatoes; and that he had now been able to reciprocate through the kind assistance of Dr. Thomson.

7. From Sir A. Bogle, Moulmein, dated 3rd May, applying for Horticultural seeds:—

"I have always been most anxious to promote the cause of Horticulture in this country, and I am now quite satisfied that the only way as regards this place is to supply the native gardeners with large quantities of good seed, and leave the rest to them. It is too soon to talk of prize shows, but they will come in time. Meanwhile I shall be greatly obliged if the Society will aid me with seeds. I am prepared to take a very large quantity for public distribution amongst the native gardeners, chiefly Chinese, in this neighbourhood."

It was resolved, on the recommendation of the Council, that as large a quantity of seeds as can be spared at a low cost be placed at Sir A. Bogle's disposal.

8. From Major G. L. Cooper, Thyet Myoo, Burmah, applying for seeds, useful and ornamental, for distribution at that station.

Resolved—That this application be met as far as the stock of seeds on hand will admit.

9. From Captain J. Hall, Erinpoorah, dated 26th May, drawing attention to the capabilities of Mount Aboo for the culture of fruits, vegetables and flowers:—

"Many thanks," writes Captain Hall, "for the packet of seeds you so kindly sent me. I hope many of the shrubs will answer on Aboo, as nearly all the English flowers grow most luxuriantly; peaches also thrive, and there are numerous nectarine trees, apparently of great age, and which have been planted near the wells. All vegetables thrive and now, when we are dried up with the hot winds down here, on Aboo there is a plentiful supply of cabbage, beet, salad, celery, onions, leeks, artichokes, beans, &c. I have some thriving tea plants in Aboo, but as I am only there now and then, the garden has not a fair chance."

(Saturday, the 14th July, 1855.)

W. G. Rose, Esq., Vice-President, in the chair.

The proceedings of the last general meeting having been read and confirmed, the gentlemen proposed on that occasion were duly elected members, viz:—

The Hon'ble H. R. Addington; Dr. John Clarke; Messrs. G. M. Jackson; H. A. R. Alexander, C. S.; C. J. Wingfield, C. S.; T. Bruce Lane, C. S.; H. B. Riddell, C. S.; George Dixon; James Slade; J. Stephen; Captain Thomas Davies; and Baboo Ramanoth Banerjee.

The names of the following gentlemen were read as candidates for election:—

Lionel Berkeley, Esq., Officiating Sudder Ameen, Azimghur,—proposed by Mr. R. Berkeley, seconded by the Secretary.

Edward Clemen, Esq., Tobacco planter, Sandoway,—proposed by Lieut. F. W. Ripley, seconded by Mr. C. A. Cantor.

H. B. Thornhill, Esq., C. S. Eta,—proposed by Mr. R. H. S. Campbell, C. S., seconded by Mr. C. E. Boileau, C. S.

Robert Spears, Esq., Golah Ghat, Upper Assam,—proposed by Baboo Peary Chand Mittra, seconded by the Secretary.

Baboo Parbutty Churn Banerjee, of Ooterparah,—proposed by Mr. E. T. Trevor, seconded by Mr. J. S. Judge.

Alexander Walker, Esq., firm of Gisborne and Co.,—proposed by Mr. J. S. Elliot, seconded by Mr. Stewart Douglas.

C. J. Ackland, Esq., Raneegunge,—proposed by Mr. H. Biddle, seconded by Mr. George Ackland.

Lieut. J S. Ingram, (1st European Bengal Fusiliers.) Assistant Superintendent Pegu and Arracan mountain road,—proposed by Lieutenant Ripley, seconded by Mr. Cantor.

Baboo Juggobundhoo Banerjee, Midnapore,—proposed by the Secretary, seconded by Baboo Peary Chand Mittra.

Presentations.

The following contributions were announced for the Library, Garden and Museum:—

1. Journal of the Royal Asiatic Society, Vol. XVI. Part I, a descriptive Cat. of the Hist. *M. S. S.* in the Arabic and Persian languages in the library of

the R. A. Society; and an Essay on the Architecture of the Hindoos. *Presented by the Royal Asiatic Society of Great Britain and Ireland.*

2 The Journal of the Indian Archipelago and Eastern Asia, Vol. VIII. Nos. 10-12, and Vol. IX. Nos. 1-3. *Presented by the Government of India*

3. Selections from the Records of the Government of India. No. VII. Punjab Road Report. *Presented by the Government of India.*

4. Seed of the "Water Rush" of the Cape of Good Hope. *Presented by Major J. A. Weller, Superintending Engineer, N. W. P.*

The Secretary brought to the notice of the meeting that the Society had received in July, 1852, some seed of this valuable rush from A. Sconce, Esq., who had forwarded it direct from the Cape; but it did not germinate in the Society's garden, though sown with great care, and under different modes of treatment. He had transferred some of the present supply to the Society's garden, and now submitted a list of members resident in various parts of the country, to whom portions might be sent for trial.

Resolved—That the seed be forwarded accordingly, reserving about a fourth of the entire quantity for distribution to any one desirous of giving it a trial, and willing to communicate the result.

5. Fifty seeds of the "Pai" tree of the Burmese, *Corypha taliera,* on the leaves of which the Burmese write their sacred books. *Presented by Lieut. F. W. Ripley.*

6. A dozen sorts of seeds—useful and ornamental—from the Mirzapore district. *Presented by Mr. J. B. Lawson.*

7. A quantity of cuttings of two superior kinds of mulberry, and a paper of acclimated cauliflower seed. *Presented by Mr. R. Dougherty, in charge of the Barrackpore Park.*

8. Specimens of vegetable products furnished by Lieut. E. C. J. Williams, Superintendent of Survey in Pegu. *Presented by the Government of India.*

The following is extract of Lieutenant Williams' letter:—"I submit specimens of 'Gamboge,' which I have tried as a pigment, and found excellent; of the juice exuded from the Toungtalay a species of *Garcinia* said by Mr. Mason to afford a fine varnish for metallic surfaces, when dissolved in spirits of turpentine; of 'Pulaskino' from the 'Poukbeng' *Butea frondosa* of 'Gumkino' from the 'Padouk' *Pterocarpus Indicus* also of fibres, roughly prepared, of pine apple, 'Roselle,' 'Pelan' and 'Kahtsaynay,' all of which, I have reason to believe can be procured in any quantity."

9. Specimens of fibre from the "Sunn" plant, *Crotalaria juncea;* of the "Sunnee," *Hibiscus cannabinus;* of coarse cloth made of the Sunnee, and a specimen of raw flax. *Presented by C. Wingfield, Esq., Magistrate and Collector of Bijnore.*

The Secretary mentioned that he had afforded Mr. Wingfield all the information in his power on the subject of his enquiries. The specimens were referred for report to the Hemp and Flax Committee.

10. Specimens from three qualities, in a duly sorted shipment of Sylhet jute sent to the London market; also samples of Bauleah, Roygunje, Surajgunje and Dessee jute for the purpose of comparison. *Presented by Baboo Parbutty Churn Banerjee.*

Referred to the Hemp and Flax Committee.

11. Another sample of the "Pooah" fibre of Darjeeling. *Presented by Dr. J. R. Withecombe, referred to the Flax Committee.*

12. A specimen of cloth manufactured at Malta, from the silk of the Eri worm *(Bombyx cynthia)* reared on the island, and sent to Colonel Jenkins, by Sir William Reid. *Presented by A. Grote, Esq., on behalf of Colonel Jenkins.*

13. Sample of Tapioca from the manufactory of Messrs. Shumboo Chunder Ghose and Co. of Beerbhoom, prepared under the personal superintendence of Beerchund Bysack; exhibited by Baboo Preonauth Sett, for report.

14. Specimens of a collection of mineral and vegetable productions. *Presented by R. Houstoun, Esq., viz :—*

a. Forty-eight samples of condimentary salt in use in the Eastern and Western salt markets of Bengal, and in the Burmese salt market, either of East India Company's monopoly manufacture, or foreign import. Mr. Houstoun furnishes "a strict and correct analysis of some of the specimens, shewing the amount of their chemical impurities, and earthy adulterations, and a sketch of the limits, and of the advantages and disadvantages of the two Bengal salt markets, as places of manufacture under the East India Company's system; and other commercial and economical particulars, with the sanitary objections and prejudices in the Eastern markets against the article provided by the Government, and against the prohibition of the article, which the instinct of the native induces him to obtain in contravention of the law, and in lieu of what the Government can alone supply."

b Thirteen specimens of timber, procured from the Chittagong timber market, with the names by which they are designated in the Price Currents there, and a practical trade account of their qualities and uses.

c. Six specimens of the dried Bail now of the English Pharmacopæia, as well as of the Materia Medica of the Hindoos, being one of every quality into which the article need be sorted.

Mr. Houstoun states that he has made over, for the convenience of the public, larger samples of the Bail to Messrs. Scott, Thomson and Co., Chemists and Druggists, Calcutta, as they are in communication with Pound, the original introducer of the article into the English market; and the season for preparing the article is now arriving, as also when it is most in use, as an unfailing remedy for the distressing diseases it so completely alleviates.

Four specimens of Bail succades.

One specimen of Bail opium, obtained by bruising the unripe fruit and leaves together till their juice is extracted, and then boiling down that juice to the consistence of opium, which, if so boiled down, closely resembles it in smell, flavor, and substance, selling for half the price of genuine opium amongst the Javanese.

One specimen of Bail gum, or of the glutinous matter round the seeds of the Bail fruit, a valuable size and varnish for painters.

A sample of Bail oil, essential oil of Bail, the Bail uttar of the natives, and the marmelle oil of the Dutch settlers in Ceylon.

A specimen of Bail root bark.

A specimen of Bail timber, with a full and comprehensive paper of the history and uses of the plant.

d. A sample of the Musk seeds of commerce, *Hibiscus abelmoschus,* the "Kalakustooree" of the Hindoos, the Hubhul mooshk of the Arabs, a celebrated ingredient used in their coffee, with such wonderful improvement of its flavor as to have led to its introduction for the same purpose amongst Europeans, even in India.

e. Twelve samples of the *Cassia lignea* and *vera* of commerce, with a full and detailed account of the article for all commercial purposes, and the places of the production of *vera* in this country, and other particulars.

f. A sample of *Bassia* grease, the kochra oil of the natives, with particulars about the article.

The best thanks of the Society were unanimously voted to Mr. Houstoun, for his valuable donations.

Reports on various subjects.

The following Reports were submitted :—

1st.—From the Cotton Committee on certain specimens of clean cotton, grown at Shahpore, in the Punjab, from acclimated American seed, and of its yarn and cloth ; and on specimens of yarn and cloth manufactured from the floss of the Mûddar plant, by the prisoners in the Shahpore Jail, submitted at a former meeting, with an interesting communication from Major G. E. Hollings, Deputy Commissioner, Shahpore. In that communication, "Major Hollings suggests that if the Society would solicit the co-operation of the Government, to the extent of offering a reward, either in the shape of a pecuniary donation or public acknowledgement to the heads of any village community of our Indian possessions, who produced the best specimens as regards both quality and quantity, of the Mûddar fibre, with reference to its value as an article of commercial importance in the year, it would stimulate private enterprize." The Committee report with diffidence on the floss yarn and cloth, and recommend their transmission to Dr. Royle, with the view of obtaining "full reports thereon from competent parties, on receipt of which the Society will be better able to judge if any encouragement should be given, and in what shape, to the extension of the cultivation of the plant in the Punjab."

Resolved—That the recommendation of the Committee be adopted; and that Major Hollings be advised accordingly.

2nd.—A brief Report from the Hemp and Flax Committee on certain specimen of fibres from Cherra Poonjee, forwarded by F. Skipwith, Esq., and submitted at a former meeting. The Committee remark that "the bad condition from actual decay, probably caused by being packed up with the *green* leaves of the plants, independently of the crude and imperfect state of their preparation as clean fibres, renders it very difficult to make a satisfactory report on them"—and they add—that if Mr. Skipwith will have some further specimens "prepared more completely, and then laid before the Society, they will probably be enabled to offer suggestions calculated to encourage the commercial industry of his locality."

Resolved—That a copy of the report be forwarded to Mr. Skipwith, and his attention solicited to the Committee's suggestions.

3rd.—From Joseph Agabeg, Esq., reporting, by request of the Society, on the four specimens of tea submitted to the last meeting, by R. Houstoun, Esq.

In reference to the above, the Secretary submitted the substance of a note from Mr. Houstoun, to the effect that these four specimens are from Munneepore, from the Eastern part of that territory, just beyond the station and district of Cachar, (not from the part towards Bhanmoo) and were cultivated, manufactured, and produced entirely by natives of Munneepore, who have some Assam people in their employ. Any quantity is to be had at Rs. 120 per maund.

4th.—From the Garden Committee, suggesting that the sum of Rs. 100 be placed at their disposal, to meet certain necessary additional expenses for the Garden, such as extra labourers for a couple of months, bone dust manure, &c., &c.

Resolved—That the suggestion of the Committee, recommended by the Council, be adopted.

5th.—From the Officiating Gardener, report for the month of June. Mr. Stubbs intimates that a large stock of fruit trees of sorts are now ready for issue, such as mangoes, peaches, pummelows, limes, lemons, grape-vine, &c., and a large supply of lychee grafts will be ready in August next. That between two and three thousand young rose plants of the several varieties growing in the garden, and upwards of 150 plants of *Gloxinias* are available to members. He alludes to the receipt, in good condition, from Mr. Anthony of Penang, of various fruit trees, namely:—the nutmeg, clove, doorian, rambootan, mangosteen, sweet betelnut, &c.; and to various other contributions to the garden, including six plants of *Victoria Regia* from the Botanic Garden. A reference is also made to the various rainy season crops, such as Jubbulpore hemp, sidas of sorts, maize of sorts, jute, duncha, &c., all which are progressing favorably, and give promise of an abundant return. The different kinds of pines are likewise yielding well, especially the Penang, Singapore, Ceylon, Dacca, and Sylhet sorts, and those received from Mr. Emerson, and the late Mr. Earle. The gardener reports the death, *from the attack of insects, of the rice* paper plant *(Aralia papyrifera,)* of which such favorable hopes were at one time entertained. Mr. Stubbs regrets to add, in conclusion, that the trial sowings of the first portion of Scotch vegetable seeds have *proved* very unsatisfactory, not more than fifteen out of the fifty-one kinds (as per tabular statement submitted,) having germinated, and even those presenting a small per centage. A second sowing of these seeds have been made, and the result will be duly communicated in the next report.

In connection with the above, the Secretary submitted an equally unsatisfactory report on the Scotch vegetable seeds, from Mr. Dougherty of the Barrackpore Park, by whom they had been subjected to a very careful and fair trial. It was agreed, before taking further steps in the matter, to await the result of sowings of the *second* batch of these seeds, just received per *Queen of the East.*

Recommendations from the Council.

The following recommendations from the Council were submitted :—

1st.—That the name of Mr. W. Thomson, (Firm of Malcolm and Co.) be added to the Hemp and Flax Committee, which requires strengthening. Agreed to.

2nd.—That the necessary expenditure be incurred in obtaining a good supply of seeds of useful esculents, such as beet, mangold-wurzel, carrot, turnip, caravansera beans, &c., &c., for distribution amongst the Cossyahs, as suggested by Colonel Jenkins in his communication read at the May meeting, and referred to the Council for report. Agreed to.

3rd.—That referring to the above suggestion of Colonel Jenkins, and to the frequent calls on the Society from public officers, *for large supplies of agricultural seeds* for distribution throughout the country, an application be made to Government for additional pecuniary aid to assist in enabling the Society to meet these constant demands. Agreed to, and that the Council be requested to prepare the necessary communication.

Communications on various subjects.

1. From Mr. Under-Secretary G. J. Morris, submitting copy of a report from Colonel Hannay respecting his experimental cotton farm at the Mathola, in the district of Luckimpore.

2. From Mr. Under-Secretary J. W. Dalrymple, submitting a memo., by the Commissioner of Pegu, on the indigenous cotton of the northern districts of the Province.

3. From the Board of Revenue, Lower Provinces, abstract of returns to their circular, regarding the winnowing of grain by means of machinery.

The above three documents were referred to the Committee of Papers.

4. From Captain G. Verner, Superintendent of Cachar, advising despatch of larger and more complete specimens of the tea plant of Cachar.

5. From Mr. Under-Secretary Dalrymple, applying for a further supply of Sea Island cotton seed for transmission to the Commissioner of Pegu.

The Secretary stated that this request had been complied with.

6. From W. T. Lewis, Esq., Resident Councillor, Penang, applying, on behalf of a French resident, for a quantity of foreign cotton seed, which he is desirous of cultivating in lieu of sugar cane.

Resolved—On the recommendation of the Council, that this request be met, Mr. Lewis undertaking to obtain a report on the result of the cultivation, with samples of produce.

7. From C. K. Hudson, Esq., in charge of the Cherra district, reporting on the result of sowings of the California potatoes, sent him by the Society, to aid in renewing the stock in the Cossyah Hills. Referring to the supply recently despatched of Darjeeling and Madras potatoes, Mr. Hudson remarks,—"I have never seen any Madras potatoes that I know of, but the California ones are certainly very fine, and I shall feel much obliged to the Society for eight or ten maunds more of them when they can be procured. The best time for despatching them from Calcutta is either in December or in June, as they will then arrive just at the planting season so as to be put down at once, and if they are packed in layers and in baskets, or in sand, they may not perhaps be so liable to ferment as in boxes. The poor Cossyahs are so anxious to obtain new seed that they offered twenty rupees a maund for it to the people who grew the California potatoes for me, and finding bribery useless, they robbed their gardens at night, and stole more than half of them, which will account for my having obtained so small a quantity of seed this time. I hope, however, to get at least ten maunds from the out-turn of the December crop, and this will enable me to make larger distributions hereafter."

8. From H. C. Richardson, Esq., Secretary Agricultural and Horticultural Society, Bhauglepore, submitting copy of proceedings of a meeting of the Society, held on the 15th May, and applying for seeds of sorts, both Agricultural and Horticultural.

9. From Dr. W. Jameson, intimating his readiness to meet the Society's request for Linseed from Saharunpore, for trial in the next cold season, for the sake of the fibre, and giving particulars as to cost, &c.

10. From Mr. Under-Secretary Hodgson Pratt, intimating that the Government are prepared to subscribe for fifty copies of the "Indian Agricultural Miscellany," for the use of the vernacular schools.

11. From Mr. D. Landreth, Philadelphia, enclosing invoice of vegetable seeds, shipped per *John Haven.*

12. From Mr. James Carter, London, intimating that the order for flower seeds is in course of execution, and the seeds will be forwarded of excellent quality, at the usual time.

13. A list of members to whom circulars in English, Bengali, and Oordoo, have been forwarded respecting the garden school and boys required for training as gardeners.

(Saturday, the 11th August, 1855.)

Baboo Gobinchunder Sen, Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed, and the following gentlemen elected members:—

Messrs. L. Berkeley; E. Clemen; H. B. Thornhill, C. S.; R. Spears; Parbutty Churn Banerjee; Alex. Walker; C. J. Ackland; Juggobundhoo Banerjee; and Lieut. J. S. Ingram.

The names of the following gentlemen were read as candidates for election:—

G. R. Clarke, Esq., Byadangah Factory, Bongong,—proposed by Mr. R. T. Larmour, seconded by Mr. J. F. Hedger.

Dr. Stewart Clark, Civil Surgeon, Allyghur,—proposed by Mr. H. B. Riddell, seconded by Mr. T. C. Loch.

Brigadier-General S. J. Cotton, H. M. 10th Regiment, commanding at Peshawur,—proposed by Major F. C. Burnett, seconded by Captain W. H. Delamain.

General James Outram, C. B., Resident of Lucknow,—proposed by Dr. J. Fayrer, seconded by Mr. James Church.

J. H. Bax, Esq., Civil Service, Azimghur,—proposed by Mr A. Grote, seconded by Mr. C. A. Cantor.

J. D. Bell, Esq., Barrister-at-law,—proposed by Mr. W. Blundell, seconded by Mr. W. G. Rose.

Captain Thos. Hutton, Mussooree,—proposed by Col. R. Houghton, seconded by the Secretary.

Lieut. Helbert, (5th Madras Cavalry) Deputy-Commissioner, Saugor and Nerbudda Territories,—proposed by Captain James Travers, seconded by Dr. Geo. Tranter.

R. Eames, Esq., Secretary Fort Gloster Mills Company, Calcutta,—proposed by Mr. C. J. Sutherland, seconded by Mr. W. G. Rose.

Wm. Watson, Esq., (firm of Watson and Co.) Calcutta,—proposed by Mr. Alex. Wallace, seconded by the Secretary.

Presentations.

1. Selections from the Records of the Government of Bengal, No. 18. *Presented by the Government.*

2. Journal of the Asiatic Society of Bengal, No. 3, 1855. *Presented by the Society.*

3. Specimens of cotton and fibres of various sorts, the produce of Colonel Hannay's experimental farm at Debroghur, in Upper Assàm. *Presented by the Board of Revenue. Referred to the Cotton and Flax Committees.*

4. Specimens of cloth and tinder from Kumaon and Gurhwal. *Presented by Lieutenant W. H. Lowther.*

The following is extract from Lieutenant Lowther's letter :—

"As I observe by the public papers that a stir is being made on the subject of indigenous products suited to the manufacture of paper, cordage, &c., I have the pleasure to send you specimens of a fibrous nature from the Himalayahs. Last year I was residing in Kumaon for six months, and there observed that the substance, packet No. 1, was extensively used for tinder only ; it is produced by a weed which covers the entire surface of the province, and appears to be an "*Artemisia*" (vide specimen from my Herbarium.) As its filaments seem to be very white and cottony when cleaned, it *might* be found of use for paper. The hill people cleanse it for their use in the simplest manner possible. When the leaves are ripening, they are stripped off the stems, dried till quite brittle in the sun, or before a fire, or then rubbed very hard between the hands, till all the woody portion disappears. The packet No. 2 is a cloth made in the neighbouring district of Gurhwal, where the plant which produces it is equally common with the above, and is equally employed by the hill men for tinder ; but it neither grows, nor is the fabric manufactured in Kumaon, so that I had some difficulty in procuring the accompanying sample, which is a piece of a very old, and nearly worn out sack, discoloured by use, or decay, and which has resisted all my attempts to clean it. The traders who were my informants, say that these bags are very highly prized for their strength and durability, far more so than those made of hemp, (and which I met with in every bazar.) I hear this material is also very plentiful near Mussooree, but is merely used as tinder, and I am told it is a 'dock.' "

Dr. Thomson, to whom the dried specimen of the plant had been referred, recognizes it as *Antennaria semidecurrens* D. C., which is a very common species of *Compositæ* throughout the Himalaya. In respect to the cloth, Dr. Thomson observes,—" I have no doubt it is made from the tomentum of the leaf of a plant, most probably *Oreoseris lanuginosa* (which is the *Chaptalia gossypina* of Royle's Illustrations) it is common all over the Hills, and not, as Mr. Lowther says, confined to Gurhwal, though there only it is made into tinder."

The Secretary stated that specimens of cloth similar to the above, were in the museum, having been received from Dr. Falconer and Major Charlton; both specimens have been manufactured from the woolly down of the leaves of the "kuffee" *(Chaptalia gossypina.)* Some particulars on the subject

5. *Specimens of oil from tamarind, cotton and radish seed. Presented by Captain Thomas Davies Superintendent of Police, Booldana.*

Captain Davies states :—"While trying, as an experiment, the extraction of oils from some jungle seeds, I happened to order a trial to be made of the seeds of the common Indian tamarind, and to my great surprise, and that of all the natives, *I obtained an oil of a fine amber color, free of smell, and sweet to the taste, and in my opinion it would prove a substitute for the usual olive oil of commerce, so much in use in India for culinary purposes, and so frequentlly adulterated. Will you submit this oil to some Member* of the Chamber of Commerce, and to a chemist also."

The Secretary was requested to endeavour to obtain a report on this tamarind oil.

6. A further supply of Australian and Sea Island cotton seed. *Presented by W. Blundell, Esq.*

7. A small quantity of onion seed of a superior description. *Presented by Captain J. Hall, of the Joudpore Legion.*

"The onions," remarks Captain Hall, "have turned out fine this season : one weighed 7 oz., and 6 of them 2 lb. 5 oz. The seed I originally procured from Balmere on the borders of the desert. A light sandy soil seems to suit them well."

8. A living plant of the "Konga" (*Marsdenia tenacissima*) and one of the "Chagul bantee" (*Dœmia extensa*) from the Midnapore district. Presented by R. Houstoun, Esq., on behalf of Juggoobhundhoo Banerjea of Ooterparah.

Notice of Motion.

Proposed by C. A. Cantor, Esq.—"That in future, the monthly general meetings of the Society be held on the second Wednesday of the month, as being a more convenient day for the majority of the Members than the second Saturday."

Communications on various subjects.

The following letters were also submitted :—

1. From Dr. J. B. Barry, suggesting the publication, in the proceedings of the Society, of extract from "contribution towards a manual on the vegetable products of India, in a paper on the bail, its propagation, cultivation, properties and uses," which has been recently presented to the Society by R. Houstoun, Esq. Dr. Barry remarks that "the season for producing the best description of bail will soon be over, and unless we can form some idea as to the expenditure, it will be impossible to prepare it some months hence, should the demand be great. It would be a great pity to keep this

preparation back from the public at large, as I have reason to believe it is the finest preparation of bail, and the best remedy ever introduced for the cure of dysentery."

Resolved—That the extract in question form a portion of the proceedings of this day's meeting.

2. From Lieutenant James Williamson, dated 29th July, from Bunnoo, respecting the culture of tobacco, vegetable seeds, &c. :—

"Some Havanna and Cuba tobacco seed you sent me in 1853, but which I had not an opportunity of sowing till October last, produced a very fine crop of excellent tobacco. The small quantity of seed yielded 2½ seers the first, and 2 seers the second growth of *cleaned* leaf, and I have now enough seed for three to four beegahs. I will sow a considerable quantity of the seed thus obtained, as well as the fresh portion you forwarded with the Scotch vegetable seeds this year, and shall be glad if you will give me some information as to the time the leaf ought to be gathered and prepared, as, so far as I can judge by the result of my own experiment, I think the culture of tobacco can be carried on here under very favorable circumstances.

"A number of the Cape seeds I wrote about last year as not having germinated at the first sowing did well when sown again later in the season. All the American seeds did well."

Lieutenant Williamson also refers to the "Prophet's Flower," of which some seed was recently presented to the Society by Major F. C. Burnett. "I have lately been in a part of the country," observes Lieut. W., "where it gives its color to the plains and hill sides, and perfumes the air, and you will, I think, find it well worth all the pains the Society can bestow on its culture. I doubt, however, if the climate of Bengal will suit it. I could not obtain any of the seed so early in the season as May last, and as I have no opportunity of obtaining it here this year, I shall be glad if you can afford me a small quantity, the proceeds of which I shall be happy to make available for distribution, should any one desire to try it in the Punjaub or Upper Provinces."

3. From Captain H. E. Read, Superintendent Dhoon Forests, Deyrah, applying for seeds of forest trees and plants, natives of America, Burmah and the Cape, valuable for their produce, for introduction into the forests under his charge.

The Secretary intimated that Dr. Thomson had kindly promised to meet Captain Read's request from the stores of the H. C. Botanic Garden.

4. From Messrs. Gladstone, Wylie and Co., applying for a quantity of cotton seed for Captain Brown, Deputy Commissioner of Henzadah in Burmah, who is desirous of attempting its cultivation in that district.

The Secretary mentioned that this request had been complied with from the stock placed at the Society's disposal by Mr. Blundell.

(Wednesday, the 12th September, 1855.)

Baboo Gobindchunder Sen, Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed, and the following gentlemen elected Members:

Dr. Stewart Clark, Brigadier-General Cotton, General Outram, Messrs. G. R. Clarke, J. H Bax, J. D. Bell, R. Eames, W. Watson, Capt. Thomas Hutton, and Lieut. Helbert.

The names of the following gentlemen were read as candidates for election:—

James Morris, Esq., Merchant, Calcutta,—proposed by Mr. R. Blechynden, seconded by Mr. W. G. Rose.

Lieutenant-Colonel J. H. Grant, C. B., 9th Lancers, Umballa,—proposed by Mr. A. Grote, seconded by Mr. C. A. Cantor.

C. Allen, Esq., C. S., Calcutta,—proposed by Mr. Grote, seconded by Mr. Cantor.

J. A. Guise, Esq., Secretary Public Garden, Banda,—proposed by the Secretary, seconded by Mr. Rose.

C. E. Creswell, Esq., Calcutta,—proposed by Mr. S. P. Griffiths, seconded by Mr. W. Stalkartt.

D. B. Lindsay, Esq., (Firm of Gladstone, Wylie and Co.),—proposed by Mr. W. Haworth, seconded by Mr. S. Douglas.

Charles Currie, Esq., C. S., Allahabad,—proposed by Mr. Grote, seconded by Mr. Cantor.

Robert Haddan, Esq., Calcutta,—proposed by the Secretary, seconded by Mr. Rose.

Capt. A. A. Macdonell, (40th N. I.)—proposed by Mr. H. H. Poe, seconded by Mr. W. H Poe.

Capt. F. W. Baugh (26th N. I.), in charge of Elephant Khedahs, Pegu,—proposed by Major Thomas Martin, seconded by the Secretary.

W. T. Lewis, Esq., Resident Councillor, Penang,—proposed by Mr. Rose, seconded by Mr. Cantor.

Presentations.

1. The Journal of the Society of Arts from July, 1854, to June, 1855. *Presented by the Society.*

2. Papers on the Tea Factories and Plantations in Kumaon and Gurhwal, (5 copies.) *Presented by the Government N. W. Provinces.*

3. Papers regarding the cultivation of Hemp in India (5 copies). *Presented by the Govt. N. W. P.*

4. Introductory Essay to the Flora Indica; by Drs. Hooker and Thomson. *Presented by Dr. Thomson.*

5. Selections from the Papers of the Bethune Society, Nos. 1 and 2. *Presented by the Society.*

6. A few seeds from New Zealand, including the New Zealand flax *(Phormium tenax.) Presented by J. Bedford, Esq.*

7. A few seeds of Eucalypti, Leucadendron, &c. *Presented by Capt. C. B. Young.*

8. A collection of tobacco seeds, consisting of Havanna, St. Domingo, German, Hungarian, Columbian and Maryland. *Presented by Lieut. F. W. Ripley.*

9. Some seeds of *Kennedya splendens. Presented by Capt. J. Eliot.*

10. A maund of acclimated pea seed. *Presented by A J. Sturmer, Esq.*

11. A quantity of mignonette seed. *Presented by T. Savi, Esq.*

12. A specimen of tea, manufactured from the tea plant of Cachar. *Presented by Captain Verner, Superintendent of Cachar.*

The motion of which notice was given by Mr. Cantor at the last meeting, that the day of meetings be held in future on the second Wednesday of the month, instead of the second Saturday, as being more convenient for the majority of the Members, was brought forward, seconded by Baboo Ramgopal Ghose. Baboo Peary Chand Mittra moved, as an amendment, seconded by Mr. S. H. Robinson, that the sense of the resident members be taken on the subject, before making the proposed alteration. The amendment was put to the vote and carried.

Nursery Garden.

The gardener's monthly reports for July and August were submitted. Mr. Stubbs states that the result of the sowings of the second consignment of seeds from Messrs. Lawson, of Edinburgh, has been nearly as unsatisfactory as the first, only 13 kinds out of 51 having germinated. The Cape vegetable seeds have germinated most freely, as have also the American. The officiating gardener gives, in detail, the result of sowings of miscellaneous seeds recently presented to the Society, amongst others the "Cape water rush," received from Major Weller, which has unfortunately proved a complete failure, as also the New Zealand flax from Mr. Bedford, and the seeds of the "Prophet's flower," from Major Burnett. The tobacco seeds of sorts contributed by Captain Ripley, and the *Corypha talitra* from the same gentleman, have germinated freely. Mr. Stubbs reports that he has now about 150 lychee grafts available for distribution : likewise a few mahogany seedlings ; and a good collection of certain sorts of ornamental plants, such as rondeletia, gloxinia, the white poinsettia, and roses of sorts. He adds, in conclusion, that a further quantity of galvanized wire fence would be desirable, that sent by the Secretary last year from England having proved a great protection to the crops against the depredations of hares ; as also about two gross more of cast-iron labels of the largest size.

It was agreed, on the recommendation of the Council, that a sum not exceeding Rs. 200 be granted for the above purpose.

Fibres.

A rather lengthy report was submitted from the Flax Committee on the various specimens of fibres recently received from Mr. Wingfield, at Bijnore; Baboo Parbutty Churn Banerjee, of Ooterpara; and from Col. Hannay's experimental farm at Deebroghur, received from the Board of Revenue. Ordered, that extracts from this report be sent to the respective contributors, and that the report itself be transferred to the Committee of Papers.

In connection with the above subject, the Secretary read extracts of letters from C. Wingfield, Esq., Magistrate and Collector of Bijnore, and Major Hollings, Deputy-Commissioner of Shahpore, in the Punjab.

Mr. Wingfield writes :—

"I beg to return you my best thanks for your letter, as also that of Mr. Stalkartt's, and the pamphlet you were so good as to send me. Mr. Stalkartt's instructions are very valuable, also those relating to the preparation of flax in your treatise, which I conclude are equally applicable to that of hemp. I have received instructions from Government to prepare and send home some fifty maunds of sunn and sunny hemp, and I intend to superintend the manufacture myself; moreover, I intend to carry out the retting process in the running water of a canal close at hand, and to extract the hemp by the breaking machine, not by the old native method of just stripping the bark and fibre from the reed, washing and laying by. I am satisfied from what I have since read on the subject, that the plants are allowed to remain far too long in the water, and hence the colour is spoilt, and the strength impaired. Considering the temperature of the water in shallow pools under the influence of an October sun, two days would, I should think, be ample for retting, whereas the natives usually leave it ten days in the water. I am convinced sunny hemp may be so prepared as to be a very valuable fibre, and I shall send you specimens of the samples I prepare in October next, under the direction of Mr. Stalkartt.

"With respect to flax, I now see what I was not aware of before, that under Schenck's process the straw may be kept for months before removing the fibre, therefore I conclude what Mr. Gubbins sent was the *straw*, not the flax prepared from the straw. To prepare the fibre here by the natives, would, in my opinion, be quite impracticable, *i. e.* at a reasonable cost, and yet I assume it could never pay to export straw to England. I should be much obliged if you would send me a small portion of the *foreign* seed expected shortly. At present my attention is more turned to hemp than flax, and indeed I think the former offers more scope for practical results than the latter. With hemp, one has only to overcome a few native prejudices as to the mode of preparation, and thereby prevent the deterioration of the article which has hitherto prevented its real value being known, but in the case of flax, one has to teach the people a new use for it.

(as the fibre has hitherto been unknown) and it would be necessary to commence by an entire change in the mode of sowing and reaping.

Major Hollings observes :—

"During the past season my attention has been directed to the cultivation of linseed, and the preparation of flax—subjects which have been taken up by the Financial Commissioner, Mr. McLeod, with a view to the exportation of these products to the markets in England. The position of the Punjab is peculiarly favorable for the development of commerce, and there are in it soils and climates suitable for the production of every kind of fruit and vegetable. When the mineral resources are better known, it will be found that the Punjab contains unlimited supplies of those valuable manures which chemistry has lately introduced to agriculture.

"I read your paper on the cultivation and manufacture of flax with much interest, and should much like to get some of the machinery for rippling, rolling, and scutching, to be used in the jail, and as soon as the profits from prison labor admit of it, I will send for them. I shall translate those parts of your remarks that I think likely to be of practical utility. I am of opinion that in the Punjab, the jails may be made schools of industry, in which the prisoners may receive useful lessons, to teach them the different processes in the arts and manufactures, and that in time they will be self-supporting. I will send you specimens of flax and twine, and also of cloth, if the prisoners succeed in making any. The favorable opinion I entertain of the qualities of the Mûddar has been strengthened, by finding that when cultivated it becomes from seed a large bush, and bears blossom in six months. I should very much like to hear of one good experiment being made to cultivate it. I sowed the seed in the beginning of the year; the plants are now of a good size. I should be glad to hear that some one capable of doing justice to the experiment had tried to cultivate the Mûddar. I still think it will prove the most valuable of the fibrous products of India. For the present I shall be happy to render any assistance in my power towards promoting the cultivation of flax, which is certainly the product that can be most readily brought into the market in large quantities. I shall be happy to receive supplies of seeds of any kind."

In reference to the remarks of Major Hollings respecting the Mûddar, the Secretary read a letter from Major J. H. Campbell, of the Artillery, to the address of A Grote, Esq., and submitted the specimen therein alluded to :—

"I noticed lately in the proceedings of the Agri-Horticultural Society, the matter of the Mûddar floss brought forward. I dare say it is not generally known that this material has been tried at home. I took some home with me in 1853, and afterwards sent a quantity to a mercantile friend of mine at Manchester, who submitted it to the Chamber of Commerce there. It was immediately recognised as being the same material that had been submitted to them a few years previous, when it was found unfit to be brought into use, partly from its short staple or fibre, and partly the difficulty experienced in getting rid of its silkiness, which prevents its being twisted into a strong thread, from its want of affinity. If this peculiarity could be got rid of, they think it might be made available for some purposes of manufacture. It was, however, thought it might be used for hats, a small quantity was given to a hatter in the above town, but as there was not a sufficient quantity to cover an entire hat, he could not give a decided opinion.

"I send you a piece of what I call gutta percha made from the juice or milk of the Mûddar, which I had also tried at home. The report made upon it was, that it was a material very like gutta-percha in many respects, but too soft to be used as a substitute. This I apprehend to arise entirely from its not having been prepared properly, and think if this was properly done, it would be found an useful article."

The Secretary having announced the arrival of a supply of Saharunpore flax seed, through the kind agency of Dr. Jameson, and the receipt by the last overland steamer of a small quantity of Dutch and Riga seed, (of which a larger quantity was ordered *viâ* the Cape, and may be expected in all October,) it was resolved that portions of both consignments, as also of a supply of the white linseed of the Nerbudda, daily expected, be sent to Major Hollings, Messrs. Wingfield, C. Gubbins and C. Horne, of Bareilly, and to such other applicants as are desirous of cultivating the plant *for the sake of the fibre,* and willing to communicate the result to the Society Further, that an application be made to the Government of Bengal for the free transmission of this seed by dâk banghy, throughout the country.

Cachar tea.

Read a letter from Capt. Verner, Superintendent of Cachar, respecting the specimen of tea referred to under the head of presentations.

The Secretary was directed to obtain a report on this tea.

Read a brief report from C. A. Cantor, Esq., on the four specimens of Munneepore tea presented by R. Houstoun, Esq., at the meeting in June last.

Resolved—That a copy of this report be furnished for Mr. Houstoun's information.

Communications on various subjects.

The following letters were also submitted :—

1. From the Under-Secretary to the Government of India, submitting reports from the Chamber of Commerce on samples of cotton and silk forwarded to Government by the Commissioner of Pegu.

Resolved—That an application be made to Government for a copy of the memorandum by the Commissioner of Pegu on the cotton and silk of that province, to which reference is made in the above communication, and to the Chamber of Commerce for portions of the specimens alluded to.

2. From Major E. F. Smith, regarding the wild grape of Bengal.

Major Smith thinks that if this indigenous wild vine were taken care of, and well pruned, it might produce a tolerable grape; at present, though juicy, it is somewhat acid."

The Secretary intimated that a specimen of the grape sent by Major Smith had reached him in a perfectly withered condition.

3. From C. Horne, Esq., C. S, applying for seeds of cotton, green indigo, tobacco, &c., and tubers of the Chinese potato for trial in the public garden at Bareilly. In regard to the tobacco, Mr. Horne writes:—"Last year I got a small packet from the Society, from which I saved about two maunds of tobacco, and two seers of seed. As the kinds were mixed in planting out, I cannot distinguish them in the produce. However, these two seers of seed have been scattered in small packets over this immense district, and I hope to see the results. The tobacco, simply dried with stalk and all, sold at Rs. 5 per maund, common country selling at Rs. 3 per maund, and superior at Rs. 4 per maund.

4. From C. K. Hudson, Esq., Cherra, acknowledging receipt of the supplies of Madras and Darjeeling potatoes forwarded by the Society.

"The Darjeeling potatoes," writes Mr. Hudson, "were all spoilt, but I obtained twenty-five seers of good Madras potatoes from the batch, and had them planted out immediately, and I will inform you of the result when the crop comes in.

"The best time for sowing vegetable seeds here is in October and November, and again from the 15th of January till the middle of February. The heavy rains which continue up to the end of September, seldom admit of our sowing them earlier, and in December and January the frost kills the young plants, unless they are well protected at night, field turnips and mangold-wurzel being, however, hardy vegetables, they may stand the frost better than other kinds. I should like to have only a small quantity of seed at first, say about a pound of each kind, to try the Cossiahs with, for they are a capricious set of people, and may not like the trouble of growing them, especially when they find that they are not readily saleable. They seem to care but little for vegetables of any kind for their own use, and consume only a very small portion of the potatoes they grow, the bulk of them being taken for sale to the plains, where they are bought up by Bengalees for the Dacca and Calcutta markets.

Ground-nuts, or pig-nuts, would grow very well, I think, in the interior of the hills, and as they would be both marketable and useful to the people, I should feel much obliged to the Society for two or three maunds of them for trial, with directions when and how to sow them, and some hints about the kind of soil they require. I should also like to try the Chinese potato, or yam, and some of Mr. Fortune's Chinese seeds of sorts, fruits, flowers, or ornamental trees, which you may think suitable to the climate of these hills. The chesnuts, lemons, and oranges would, I dare say, grow very well in the lower ranges, from whence Calcutta is chiefly supplied with oranges."

5. A list of the Transactions of the Society, (Vols. 1 to 8) on hand, amounting to 1200 copies.

Resolved—On the recommendation of the Council, that these be disposed of, in future, at Rs. 1-8 a volume.

(*11th October,* 1855.)

Baboo Gobindchunder Sen, Vice-President, in the chair.

Members Elected.

Messrs. James Morris; C. Allen, C. S.; J. A. Guise; C. E. Creswell; D. B. Lindsay; Charles Currie, C. S.; Robert Haddan; W. T Lewis; Lieut-Colonel J. H. Grant, C. B.; Captain A. A. Macdonell; and Captain F. W. Baugh.

Candidates for Election.

T. J. Driberg, Esq., Bugchupah, Monghyr,—proposed by Mr. C. A. Cantor, seconded by Mr. W. G. Rose.

Joshua Jenkinson, Esq., (firm of J. Ward and Co.),—proposed by Mr. A. T. T. Peterson, seconded by Mr. T. E. Carter.

W. T. Tucker, Esq., C. S., Monghyr,— proposed by Mr. John Bean, seconded by the Secretary.

Walter Bourne, Esq., Resident Engineer, E. I. Railway, Monghyr,— proposed by Mr. Bean, seconded by the Secretary.

G. S. Fagan, Esq., Senior Magistrate of Calcutta,— proposed by Mr. H. H. Poe, seconded by Mr. Cantor.

Richard Battersby, Esq., Nosibshye Factory,—proposed by Mr. W. Haworth, seconded by Mr. S. Douglas.

Walter King, Esq., District Engineer E. I. Railway, Patna,—proposed by Mr. Haworth, seconded by the Secretary.

Richard Doyne, Esq., Barrister-at-Law,—proposed by Mr. L. Clarke, seconded by Mr. Peterson.

Presentations.

1. A Guide to Analysis, in Geological and Agricultural Chemistry, (2 copies). *Presented by the Government of Bengal.*

2. Journal of the Asiatic Society of Bengal, No. 4 of 1855. *Presented by the Society.*

3. Ondaatjee's Observations on the Vegetable Products of Ceylon, Parts 1 and 2. *Presented by James Watson, Esq.*

4. A collection of useful plants from Sandoway. *Presented by Lieut. F. W. Ripley, Principal Assistant Commissioner of Arracan.*

"There are 6 kinds of Shaw," writes Lieut. Ripley, "5 of which are different to any of those sent previously. No 6, the Yaseng-shaw, is by far the finest of those I have seen; the fibre is silky and white and strong. I am having some of each kind carefully prepared; but the weather at present is too damp for it to dry properly. I do not know whether the other plants will be worth having, but I have put them in to fill the cases 9, 10, 11 and 13 all make excellent preserves, although not generally eaten raw. The fruit of No. 11, I think, with cultivation, might be made to grow equal to an European egg plum. No. 12 Mason calls *Heritiera attenuata;* it grows wild, is a handsome tree, and the fruit is pleasant, something like the Duco of the Straits. I should add that Nos. 1, 4 and 5 are not procurable in any large quantity, but No. 6 is plentiful."

The Secretary reported that of the above collection, No. 10 ("a species of Fig.") and No. 13 (an "acid plum") and 3 plants of the Shaw, had not survived the voyage; the others had reached in good condition.

5. Specimens of cotton and silk from Pegu. *Presented by the Chamber of Commerce.*

[These are portions of the specimens respecting which the Chamber have reported to Government, and to which allusion is made in the proceedings for September.]

6. Twelve specimens of paper made in the Moradabad jail. *Presented by Dr. W. S. Stiven, Civil Assistant Surgeon.*

7. Sundry specimens of vegetable products from Ceylon, namely, Gum-kino from *Pterocarpus Marsupium:* black varnish from *Semecarpus oboratum:* indigo from *Indigofera tinctoria;* paper from the inner bark of *Gnidia eriocephala;* fibre from *Sanseviera Zeylanica,* and the inner bark of the Ceylon sack tree (*Antiaris saccidora*); this inner bark comes off entire, like a woven fabric, and is made into sacks, like the specimen submitted, which are very durable. *Presented by James Watson, Esq., on behalf of Mr. W. C. Ondaatjee, of Badulla.*

Mr. Watson states that further particulars respecting these specimens will be found in the pamphlet above referred to, which contains much useful and interesting information, in an unpretending form, on the vegetable and mineral products of Ceylon. In regard to the Indigo, Mr. Watson observes, that it has been manufactured by Mr. Ondaatjee according to the Jessore process as he himself described it to him. "The absolute want of works," adds Mr. Watson, "made the process any thing but satisfactory. An hospital tub was used as steamer and beater, and a long copper as boiler. The Indigo is considered as superior to common Futtyghur, and when the disadvantageous modes in which the manufacture was attempted, are borne in mind, the result may be considered very fair. The Indigo plant grows to a fair size, and is little inferior to the cultivated plant of Bengal. It grows quite wild in Ceylon, and might be cultivated there. The scarcity and demand of labor, however, is, it is feared, an insurmountable obstacle."

8. A small quantity of Chinese safflower seed. *Presented by R. Fortune, Esq.* Mr. Fortune remarks that he has met this plant for the first time during a recent journey into the interior. It is largely cultivated by the Chinese for the sake of the dye, which is used for dying some of the silk and crape fabrics manufactured in the great silk towns of Central China; it grows in the cotton country some few miles west from Shanghae, and apparently requires a cool winter and warm summer to bring it to perfection.

9. A small quantity of Java tobacco seed from a fresh stock of last season's crop at Sourabaya. *Presented by Lieutenant Ripley.*

The Secretary reported, that in accordance with the amendment carried at the last meeting, he had taken the sense of the resident Members in respect to the proposed change of the days of general meeting, and that the great majority were in favor of holding the meetings in future on the second Wednesday of the month instead of the second Saturday. *Resolved accordingly.*

Nursery Garden.

The monthly report from the officiating Gardener was submitted. He states that, with three or four exceptions, the American vegetable seeds have germinated freely, as per tabular statement annexed. The Gardener furnishes a list of fruit grafts and ornamental plants now ready for issue, among the former, peach, mango, lychee, pummelow, loquots, wampee, pomegranate and vines; and among the latter, euphorbias, rondeletia, gloxinias, begonias, roupellia, cordia, white poinsettia, bignonias, memecylon tinctorium, and roses of 20 sorts. He also adds a list of such seeds presented during the past mouth as have germinated and failed.

In connection with the above, a Report was read from Mr. Dougherty, Superintendent of the Barrackpore Park, on the Cape vegetable seeds, fully agreeing with that furnished last month by the Society's gardener. Mr. Dougherty states that with two exceptions, spinage and orange carrot, the whole collection has vegetated very freely, and he adds "I have never seen better vegetable seeds, they must have been well selected, and carefully put up for this country."

Cachar tea.

Read a report from Joseph Agabeg, Esq, on the two samples of tea received from Captain Verner, Superintendent of Cachar, and submitted at the last meeting:—

Ordered.—That a copy of these reports be forwarded to Captain Verner.

Farewell Address to, and Reply from, the late President of the Society.

The Council having submitted a copy of the farewell Address to the late

President of the Society, and Sir Lawrence Peel's Reply, as received from the deputation which waited on him; it was resolved that they be entered on the records, and published as part of the proceedings of this day's meeting:—

To the Hon'ble Sir Lawrence Peel, &c, &c., &c.

SIR,—When your letter, resigning the office of President of the Agricultural and Horticultural Society of India, was submitted at the General Meeting in July, 1854, the Council expressed their great regret at the loss which the Society thereby sustained, and recommended that a suitable Address should be presented to you, at the proper time; and that, in the meanwhile, you should be requested to sit for a full length portrait, to be placed in the Society's Hall, as a Memorial of the services rendered by you to this Institution. The meeting fully entering into the sentiments of the Council, resolved that the above recommendations be adopted and carried out.

At the General Meeting held in the following October, we learnt with regret, that you had declined the proposal of a portrait for the reasons detailed in your letter then submitted. Such being the case, it only remains for us to reiterate the expression of the loss the Society has sustained by your resignation of the office of President, which you have held for upwards of six years.

While during your residence in this country you have done much to pormote, in various ways, the cause of Horticulture,—more especially by the constant importation of new and valuable plants, which have been propagated and freely distributed, and which demand our best acknowledgements—we feel that they are no less due for your very liberal assistance to the Society at various periods, more especially towards the establishment of floricultural exhibitions, which have been regularly held during the past ten years: in frequent contributions to our garden and library; and for timely aid rendered, enabling the Society to arrange satisfactorily for obtaining possession of their present handsome apartments in the Metcalfe Hall.

Though general allusions may seem irrelevant in an address of this character, we cannot, Sir, overlook the fact that the Society has been fortunate in having possessed for several years the services of a President whose distinguished philanthrophy will long preserve his name and character, not only among the Members of this Institution, but in the grateful recollection of the inhabitants of Calcutta.

With best wishes for your restoration to health, and many years of happiness in your native land, we beg, on behalf of the Society, to tender you a hearty and sincere farewell.

CALCUTTA: 13*th September*, 1855.

Gentlemen,—I thank you heartily for the Address which you have done me the honor of presenting to me.

I should not merit your good opinion, if I could receive this expression of it with indifference. If, as I think, you have overrated the value of my services to the Agricultural and Horticultural Society of India, it is your kindness which has warped your judgment, a kindness that never failed me during the whole period of my service as an officer of that Society, which I served first as Vice-President, and afterwards as President for nearly thirteen years. A taste for Horticulture, one of the objects which this Society was formed to promote, a skill in laying out grounds which I know not how I acquired, a wish to promote in others innocent tastes which I have found so productive of enjoyment to myself, a deep sense of the usefulness of the Institution, and zeal to promote its interests,—beyond these I am not aware that I possessed any qualifications for the office of President of our Society—a Society which possesses not a few Members who unite to the above qualifications those of a higher nature, some rich in science, in which I am poor indeed, and others better acquainted than I am with the natural riches of this teeming land, and better able than I am to instruct others as to the place of growth and mode of cultivation and preparation of many of its important and as yet undeveloped productions.

I thank you, Gentlemen, for the wishes for my health and happiness in another land which you have kindly expressed.

You have alluded in terms of praise to my gifts of money. It is true that I have given away much money, but I take therefore little credit to myself. I gave out of my abundance, but there are many amongst us who poor themselves give away that which they can scarcely do without, and suffer privations because of their gifts. I never had the wish to lay up riches, and in forbearing from accumulation I have practised no self-denial and therefore merit not praise. It is rather a happiness than a merit to possess a heart that warms towards one's fellow-creatures, and I thank God that he has never suffered me to think myself better than or apart from other men, and that he has given me the wish to share with them that which has been given in abundance to one that deserved it little. I hope that I may by His mercy be permitted, though possessing less abundant means, to contribute still, in the same proportion to my means, to the wants of others, and as I shall continue to draw the larger part of my income from this country, its poor will still have the first claim upon me.

It was a vain and foolish, if not an ungrateful thought, that which I once entertained, that the day of my departure from this country would be one of pure joy. I feel now that in parting from many friends whom I love and respect, from some in humbler stations who have been attached to me by the ties of service, from those who have tended me in the time of sickness and trouble, notwithstanding I shall set out to join those from whom I have been long separated and whom I dearly love, sorrow will at that day mingle largely with my joy. Gentlemen, I bid you farewell in the hope, that when

I am no more, I may be remembered, though for a little time, as one who loved the land of his temporary adoption with a love inferior to that only which he bore to the land of his birth.

Communications on various subjects.

The following letters were also submitted :—

1. **From Lieutenant F. W. Ripley, notes regarding the cultivation, drying and curing of tobacco.**

2. From the Under-Secretary Government of India, forwarding copies of memoranda by the Commissioner of Pegu on the cotton and silk of that province.

The above two communications were transferred to the Committee of Papers.

3. From Major G. E. Hollings, Deputy Commissioner of Shahpore, in the Punjab, on the "Peeloo" shrub *(Salvadora Persica).*

"The people in this part of the world live for about six weeks in every year on the berries of the Peeloo, the commonest bush throughout the Bar, which is the name given to the jungle. Can you tell me if any attempt has ever been made to cultivate it? The soil in which it thrives is a loamy clay over sand."

4. From Dr. W. Jameson, advising the despatch of a quantity of linseed from Saharunpore. The Secretary reported that this seed had reached in excellent condition, and was available to Members, or others desirous of giving it a trial for the sake of the fibre.

5. From J. B. Williams, Esq., Jubbulpore, intimating his inability from untoward circumstances, to send the white linseed, as promised, for this season's sowing, but offering to forward a quantity in the early part of next year from the new crop.

Resolved—That Mr. William's offer be accepted.

6. From Mr. S. Ainsworth, successor to the late Mr. James Carter, advising the despatch of the Society's annual order for flower seeds.

These seeds have been received, and are in course of distribution to members.

7. From Messrs. Grindlay and Co., advising the despatch of the Society's New Medal Dies. Also received.

(Wednesday, the 14th November, 1855.)

Baboo Gobindchunder Sen, Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed.

The gentlemen proposed at the last meeting were elected members, viz :—

Messrs. T. J. Driberg ; Joshua Jenkinson ; W. T. Tucker, C. S. ; Walter Bourne ; G. S. Fagan ; Richard Battersby ; Walter King ; and Richard Doyne.

The names of the following gentlemen were submitted as condidates for election :—

Captain A. M. Campbell, (16th M. N. I.),—proposed by Major R. Ouseley, seconded by the Secretary.

Lieutenant E. A. Craster, Engineers, Gowhatty,—proposed by Major W. Abercrombie, seconded by Mr. Grote.

Lieutenant F. R. Maunsell, Engineers, Roorkee,—proposed by Major Abercrombie, seconded by Mr. C. A. Cantor.

Henry M. Low, Esq., Thyet Myew, Burmah,—proposed by Mr. James Church, seconded by Mr. W. G. Rose.

Captain J. H. Bristow (19th N. I.) Officiating Deputy Commissioner of Mozufferghur, Punjab,—proposed by Mr. J. H. Prinsep, seconded by the Secretary.

R. H. Russell, Esq., Civil service, Chittagong,—proposed by Mr. A. Sconce, seconded by Mr. F. Beaufort.

The Rev. James Long of the Church Missionary Society,—proposed by Baboo Pearychand Mittra, seconded by Mr. J. Agabeg.

J. U. Sandys, Esq., Calcutta,—proposed by Baboo Gobindchunder Sen, seconded by Mr. Cantor.

Presentations.

1. Selections from the Records of the Government of India, No. 8, Report on the Metalliferous deposits of Kumaon and Gurhwal. *Presented by the Government.*

2. Selections from the Records of the Government of Bengal, No. 21, on Dacoitee, (2 copies). *Presented by the Government.*

3. Returns relating to Native Printing Presses and Publications in Bengal. *Presented by the Rev. J. Long.*

4. Two cases of useful and ornamental plants from the Royal Botanic Garden at Mauritius. *Presented by the Superintendent, Mr. W. Duncan.*

5. Twelve seeds of *Victoria Regia,* the produce of his garden. *Presented by B. Warwick, Esq.*

6. A few plants of Mangosteen and Durian. *Presented by James Cowell, Esq.*

7. Tubers of the "Atees" *(Aconitum heterophyllum,)* and specimen of the Powder. *Presented by Captain W. H. Lowther.*

The following is extract of Captain Lowther's letter, respecting the above drug:—

"I dare say you may have lately seen in the newspapers that a drug called *Atees,* (*Aconitum heterophyllum* of Wallich,) has been most successfully employed by Mr. Sub-Assistant Surgeon Heming, (in medical charge of this station, Oorai, in Bundlecund,) during the late severe epidemic, in which quinine, strange to say, had no beneficial effect. As I thought the subject was one in which your Society would be much interested, I have ascertained all particulars connected with the root, from the above gentleman, who has forwarded an official report on the same to the medical authorities in India. It appears that the plant is chiefly to be found in the Deccan, especially in Goozerat, whence it is conveyed to the market of Indore,—doubtless it is to be procured at a low price on the spot, but *here*, I am informed, it is to be obtained with difficulty at 9 Rs. per Company's seer. There is a spurious description of the drug nearly resembling the genuine in *appearance*, but not possessing a quarter of its efficacy as a medicine. As you will perceive from the prepared specimen, the true *Atees* is intensely bitter—slightly astringent,—and therefore highly tonic, it only remains to be proved how far that expensive medicine quinine may be dispensed with, and whether the *Atees* is capable of successful cultivation or improvement, or if it is indigenous to any extent in other parts of the country. I have the pleasure to enclose a small quantity of the ground drug, and two tubers of the natural plant. The farina is totally free from any noxious qualities, and *any* quantities of the powder may be administered without ill effect."

8. Samples of Sandoway tobacco, and of tobacco the produce of Java seed, both fermented and cured after the process described in his paper submitted at the last meeting; also a sample of Sandoway tobacco of the best kind, dried after the native fashion. *Presented by Lieutenant F. W. Ripley.*

9. Sample of the "Yaseng Shaw;" also piece of a creeper, called "Gnan." *Presented by Lieutenant F. W. Ripley.*

Lieutenant Ripley intimates his intention of sending some fibre of the *Gnan* creeper to the Society so soon as he has had some prepared; it is used for boat cables, &c., being of great strength.

10. Samples of tobacco, the produce of Assam seed, and of seed received from the Society. *Presented by Captain E. A. Rowlatt.*

11. A black board for the use of the Society's garden school. *Presented by C. J. Montague, Esq.*

12. A sample of tea grown and manufactured at Darjeeling by Captain Masson. *Presented by Dr. Thomson, on behalf of Dr. Campbell.*

(Referred for report to Messrs. Joseph Agabeg and Francisco Pereira.)

Communications on various subjects.

The following communications were also submitted:—

1. From R. Houstoun, Esq., analysis of culinary salts and saline earths and substances used within the territories of the E. I. Company, shewing the amount of their chemical impurities, &c., with remarks on the same subject.

2. From Captain Thomas Hutton, a note on *Auricula.*

The above communications were referred to the Committee of Papers.

3. From the same, applying for eggs of the Arindy silk worm, (*Saturnia Cynthia*) and of *Bombyx Mori.* "I am most anxious"—observes Captain Hutton—"to compare the species (Arindy) in all its stages with one that

occurs in these hills, and which I at present hold to be *new*, though it would be difficult to distinguish the Imago from that of the Arindy worm. If you could add eggs of the *Bombyx Mori*, and any other species of that genus occurring in Bengal, I should esteem it a great favor, as I am most anxious to draw up a paper on our Indian silk worms, including no fewer than eight species found in this neighbourhood [Mussooree.] Besides the *Bombyx Mori* you have, I know, a second species which, if I mistake not, will prove to be the *B. Huttoni* of Westwood, found here on wild mulberries, though at the same time it is not improbably distinct. Comparison of the insects through all its stages is, however, necessary to decide the point, as it sometimes happens that species which to ordinary eyes are absolutely identical in the Imago stage, are totally distinct as to the caterpillars; and here the closet naturalist is apt to disseminate a vast amount of error. It is for this reason that I wish to compare the caterpillars of *S. Cynthia*, with those of my Mussooree species."

The Secretary stated he was endeavouring, through the kind assistance of Col. Jenkins, and other members, to meet Captain Hutton's request.

4. From Captain G. Verner, tendering his best thanks for the reports of Messrs. Agabeg and Pereira, on the specimen of Cachar tea submitted at a recent meeting.

"Both reports," writes Captain Verner, "are, I am happy to say, even more satisfactory than I had reason to expect, and I hope that when the plant is cultivated and properly manufactured, that really good tea will be turned out of Cachar. I am in great hopes that the cultivation of the plant will be carried on with energy; three parties have commenced work, and six other European speculators have applied for tea lands, and which promises well, considering that it is only some three or four months since it was ascertained that the indigenous plant was growing in the jungles of my district; and for all which I am much indebted to you and to the Society.

5. From Col. Jenkins in reference to the fibre of the bamboo as applicable for paper manufacture :—

"In commenting on the recommendations of converting bamboo to pulp for paper, I see the Editor of the *Friend of India* appears to think the cost of the bamboo would prevent the use of this plant for the purpose. don't know what may be the price of bamboos about Calcutta, but if they be had cheaply at no place nearer, I could refer to the hills every rracan as affording an inexhaustible supply for the cutting only. Karens or Khyans, I forget their name exactly, only culti- one or two years, and the deserted land is then covered as in other places with grasses—this in fact is Rahi and Cossah hills (the lower ranges) but in the bamboo that springs up is a large and difficult of cutting, and cumbersome to carry;

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drug:—
"I dare say
called *Atees*, (*Acon*
fully employed by Mr. Sub-A
this station, Oorai, in Bun
quinine, strange to say, h
was one in which your Socie

but the Arracan bamboo does not grow in clumps, but as grasses, each plant distinct, is thin wooded, and very easily cut, and if it could be converted partly to a fibrous state on the spot, could be readily transported to the nearest creek.

"Would any of our reeds—kaggras or nuls—give a fit fibre?—if so there would be no difficulty in supplying all the presses in the world from the Bils of Sylhet, Cachar and Assam."

6. From Messrs. Peter Lawson and Son, Edinburgh, advising shipment per *Monarch* of a quantity of Riga and Dutch flax seed, as ordered by the Society.

Resolved—On the recommendation of the Council, that this seed be advertized for gratuitous distribution to members and others, on the understanding that they intend growing the plant for the sake of the fibre, and are willing to communicate the result of their experiment to the Society, and furnish a specimen of the produce.

7. From the Under-Secretary Government of India, intimating that the Hon'ble the President in Council cannot accede to the Society's request for free transmission of flax seed by dâk banghy to Government servants who are desirous of introducing it into their respective districts solely for public purposes.

8. From C. Wingfield, Esq., a few additional remarks on the culture of flax and other fibrous plants in the district of Bijnore.

9. From Major G. E. Hollings, on the subject of Mûddar floss:—

"My experiments with the Mûddar floss," writes Major Hollings, "have gone further than those to which Major Campbell alludes in the proceedings of the September meeting of the Society. You have in your rooms specimens of thread, cloth and ornamental needle-work made from it. I sent similar specimens to the Paris Exhibition; the thread is not so strong as I could wish, but if it is sufficiently so to admit of its being worked into fabrics by the prisoners in the district jail; it is not unreasonable to expect that some happy combination of a knowledge of chemistry a l mechanical skill will ere long result in the production of an useful and valuable fabric, in which the softness of silk, the warmth of wool, and lightness of cotton, will be united. I am having some carpets made with it, which promise to answer very well. Whilst mentioning what I have done regarding the floss, I would wish you to recollect that the experiments were made simultaneously with those I instituted, with a view of ascertaining the properties of the fibre to which my attention was more particularly directed and of the substitute for gutta percha, in which I only attempted to confirm the experiments made by Dr. Riddell.

In the course of a few days I purpose sending to you specimens of the twine, thread and cloth made from the linseed grown in the Shahpoor district; the fibre is short, but it appears to me to be strong and likely to prove useful.

10. From C. Gubbins, Esq., respecting the viscid juice obtainable from *Asclepias rosea*, and the purposes to which it may be applied :—

"I mentioned to you my getting fibre from the *Asclepias rosea ;* in doing so a quantity of white viscid juice came about our hands, and on drying I have got a capital bit of Indian rubber. Dr. Clark approved of it so much that we have tried making water-proof cloth, first washing or brushing each cloth with a coating of the juice, and when that is dry, putting another coat and sticking two together. It has answered most admirably, but as he required 100 yards of cloth a year for his post bags, I am afraid he would require many of these trees to furnish him with a sufficient quantity of juice. The creeper grows extensively in the valleys about Simla, and might be propagated in the forests there to any extent.

11. From the Under-Secretary, Government of India, dated 12th October, intimating that the Society's application to the Hon'ble the Court of Directors, for additional pecuniary aid for special purposes, will be forwarded by the next mail, with a favorable notice from the local Government.

12. From the Secretary to Government N. W. P., forwarding copy of a notification on the subject of grants of lands for tea culture in the Kumaon and Gurhwal districts of the province of Kumaon.

13. From W. T. Lewis, Esq., forwarding a copy of the "Penang Gazette," containing some remarks of his respecting the destruction caused to the nutmeg trees by the *Cerambyx heros.*

14. From the Reverend E. H. Higgs, dated Debroghur, Upper Assam, applying for seeds of various sorts, among others for seed of a superior and prolific kind of Indian corn.

"I have a small colony of Abors on my farm," writes Mr. Higgs, "and from the seed you send, they would readily raise a crop for distribution in their own hills. Indian corn is a standard crop with them, and furnishes fully one half of their food ; an improved and prolific kind would be most acceptable. I have already distributed a large quantity of tobacco seed, Havanna and Sandoway, which has answered very well and delight the people much."

The Secretary mentioned he had prepared a box of useful seeds for despatch by next steamer to Mr. Higgs.

(*Wednesday, the* 12*th December*, 1855.)

Baboo Gobindchunder Sen, Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed.

The gentlemen proposed at the last meeting were elected members, viz :

Captain A. M. Campbell, Lieutenant E. A. Craster, Lieutenant F. R. Maunsell, Captain J. H. Bristow, Messrs H. M. Low, R. H. Russell, C. S., J. U. Sandys, and the Rev. James Long.

The names of the following gentlemen were submitted as candidates for election :—

Lieutenant E. W. Dun, Adjutant 2nd Cavalry, Hydrabad Contingent,—proposed by Lieutenant J. De C. Sinclair, seconded by the Secretary.

W. Foley, Esq , Merchant, Dacca,—proposed by Major Fleetwood Smith, seconded by Mr. W. Wienholt.

John Parry, Esq., Merchant, Calcutta,—proposed by Mr. R. F. Ross, seconded by the Secretary.

Richard Lauder, Esq., Calcutta —proposed by Mr. R. G. Haddan, seconded by the Secretary.

John Capper, Esq-, Calcutta,—proposed by Mr. George Ackland, seconded by Mr. W. G Rose.

Lieutenant R. Stewart, (22nd N. I.,) Commandant, Kookie Levy, Cachar,—proposed by Lieutenant H. S. Bivar, seconded by the Secretary.

Presentations.

1. Selections from the Records Government of Bengal, No. 22, (two copies.) *Presented by the Government.*

2. A quantity of ginger roots from West India stock. *Presented by G. W. Thwaites, Esq., Superintendent Royal Botanic Garden, Ceylon. (Available to Members.)*

3. Seed of a valuable species of *Mesembryanthemum,* from the Cape of Good Hope. *Presented by Captain C. B. Young, of the Engineers.*

The following is extract of Captain Young's note on the subject :—

"As you doubtless know, the plant grows and spreads creeper-like with great luxuriance over a pure sandy soil. It might therefore, if it will grow in India, be the means of abating the inconvenience in cantonments and other places of large sandy tracts of ground. Besides this, the transparent juice of the leaves, expressed and drank in small quantities, is found at the Cape to be an invaluable remedy in severe cases of dysentery."

4. A quantity of tubers of the Yam of Northern China, (*Dioscorea Batatas*) known as the Chinese Potato. *Presented by R. Fortune, Esq.*

These have arrived in excellent order, and are available to members and the public generally. As this yam grows from small pieces, like the common potato, one tuber is sufficient for a fair trial.

5. Plants of the Ceylon "King Cocoanut" and of the Singapore "Magnum Bonum"; also grafts of three very superior kinds of Mango. *Presented by Joseph Agabeg, Esq.*

6. A plant of the Wild Grape of Dacca. *Presented by Major Fleetwood Smith.*

7. Specimen of oil from Sunflower seed. *Presented by M. Betts, Esq.*

This oil has been reported by a good judge of the article, as good in color and purity, but deficient in body.

8. Two samples of cotton raised from foreign seed at his factories in the Patna and Shahabad districts. *Presented by W. H. Poe, Esq.*

Mr. Poe states that the larger sample is the produce of some old plants which have been yielding cotton for 6 or 7 years, but from what particular seed he is unable to state. The smaller bag is the produce of plants grown from Sea Island seed which Mr. Blundell gave Mr. Poe last year. This last cotton, Mr. Poe adds, has apparently suffered from the seedlings having been transplanted; but that all he has been lately sowing is not to be transplanted, and he hopes next year to have a good show of plants.

The Committee consider the large sample as of good color and cleaner than is usually seen: fibre strong, were the staple longer, a higher value than 4½*d.* to 5*d.* per ℔. (at which they value it) might be put on it. The smaller sample, the Committee consider a less serviceable cotton than the longer; the quality being so mixed that it is difficult to value it: the bulk has little or no length of staple, but here and there the Sea Island length of staple is met with; in staple it is less strong than the other muster; while the fineness of the bulk appears uniform.

The following articles, the produce of the Society's garden, were also placed on the table:—

A specimen of coffee, (considered of good quality) raised from Ceylon stock.

A specimen of fibre prepared from *Sida Asiatica.*

Half maund of fibre of *Crotalaria tenuifolia* (Jubbulpore hemp).

Resolved—That the Jubbulpore hemp be transferred to Mr. Stalkartt, he having kindly offered to test it, and report the result to the Society; the other description of fibre was transferred to the Committee for report.

Nursery Garden.

The Gardener's monthly report was submitted. Mr. McMurray announces that only 62 out of 85 sorts of the English flower seeds have germinated; but as this batch was sown previous to his resuming charge, a second sowing of all sorts has recently taken place, from which he will be able to give a correct return on the good or bad quality of the seeds in his next report. The usual quantity of two maunds of imported Cape and American pea seed was sown on the 20th November: the whole of the kinds have germinated extremely well, and will probably, from the present appearance of the crop, give the usual good return in the shape of acclimated seed for distribution next year to members. Mr. McMurray further reports the sowing of 50 seers of the Saharunpore flax seed, and 30 seers each of Dutch and Riga seed: the first named has germinated freely; the second has been sown too recently to note the result on the present occasion. The gardener then goes on to state as follows:—

"In my report of November, 1854, which was accompanied by a bale of fibre of *Sida rhomboidea,* I remarked that the *Sida Asiatica* was also likely to yield a fair description of fibre, if brought under careful cultivation; this has been done in a small scale in the garden during the last season, and I now forward the produce for laying before the present meeting; as also the fibre yielded by the Jubbulpoor hemp plant. The coffee plants which were placed under the cocoanut trees at the west end of the garden are beginning to yield a few berries, a portion of which I also forward; they are of a large size, well filled, and the seed even, as will be seen from the sample now submitted. I have further to state that the whole crop of sugar cane, amounting to about twelve thousand, are fit for cutting. One of the three kinds of flower seeds from Rangoon which were presented by Captain G. G. Denniss, of the Fusiliers, in April 1853, from which plants have been raised in the garden, has recently flowered; it proves to be a new variety (to our collection) of Thunbergia, as will be seen from the accompanying cut specimen; the flower resembles *Thunbergia grandiflora,* while the leaves and habit of the plant are like that of *T. coccinea.*"

The Gardener closes his report with a detailed notice of various recent presentations of plants to the garden from Messrs. James Cowell, B. Warwick, Joseph Agabeg, Major R. Ouseley. Major F. Smith, and 50 glass tube labels from Mr. J. N. T. Wood.

In connection with the above report, the Secretary submitted one from the Superintendent of the Barrackpore Park on Carter's English flower seeds. Mr. Dougherty states that out of 84 kinds, 74 have germinated freely, and he believes the flower seeds of this season to be quite as good as those other seasons generally. The kinds which have not germinated are Collomia, Alonsoa, Cineraria, Chænostoma, Martynia, Geum, Lobelia, Marygold and Larkspur.

Read the following report from Messrs. Francisco Pereira and Joseph Agabeg, on the muster of Darjeeling tea submitted at the last meeting:—

"We beg to acknowledge receipt of your letter of the 17th instant, accompanied by a muster of tea, which had been submitted to the Society, unaccompanied by any information, save that it has been grown and manufactured at Darjeeling by Captain Masson, and requesting our opinion on the same.

"We have tried the tea which appears to us of very fair quality, and we are of opinion that with a little care in the manufacture, it will improve and be equal to the Assam teas we have tasted.

"From the appearance of the Darjeeling tea, we think that the plants from which the musters were manufactured are not of the same kinds, and we think each kind of tea should be manufactured separately.

"We also tried this muster mixed with plain China Pouchong, and found it very good."

Communications on various subjects.

The following letters were also submitted :—

1. From Dr. H. Falconer, dated London, 20th September, acknowledging receipt of the letter communicating a special vote of thanks passed by the Society at their meeting in April last. Dr. Falconer writes ;—"I have always felt a lively interest in the objects of the Society, and been impressed with the vigour and usefulness with which they were followed up by the Council and Secretary ; and it is gratifying to me to find that the Society should consider that I had taken a useful share in its business.. Although now—from non-residence—a retired member, I shall be happy to be of service to the Society in any way that I can render it."

2. From Major G. E. Hollings, Deputy Commissioner, Shahapore, dated 4th November, on the subject of cotton culture in the Punjab :

"I received last evening," writes, Major Hollings, "a letter from Lieutenant Paske who was my Assistant, and took to England with him specimens of different articles produced in this district. The following is an extract from his letter :—

" 'You may remember that I brought home a sample of the cotton grown by you from acclimated American seed. This I have had shown to some cotton-spinners at Manchester, who say it is the best cotton they have seen produced in India, even directly from American seed, and worth from 6¼ *d.* to 6½ per ℔. which is a very high price for cotton. I certainly think that American cotton seed ought to be largely imported into India along the banks of our Punjab rivers on tracts of land admirably suited for the growth of cotton. The cotton that might there be cultivated could at a trifling cost be carried down the Indus in country boats to Kurrachee, and from thence shipped to England.'

"The cotton above alluded to was grown at Shahpoor from seed acclimated at Leia—originally received from the Society—through Mr. Edgeworth, the Commissioner of Mooltan, who gave some Mexican seed to Captain Farrington in April or May, 1851, who kindly sent some to me for experiment. In the following year Captain Farrington sent some seed to Captain Voyle at the proper season in 1852, who had it sown. The result is reported in my communication published in the 3rd part of the 8th Vol. of the Society's proceedings in 1853.

"When I arrived at Shahpoor in January, 1853, I thought the soil and climate was likely to be well suited for the cultivation of cotton, and applied publicly to the Commissioner for a supply of seed. He referred me to the Lahore Agricultural Society, the Secretary of which informed me that there was none available. I therefore resolved to send for some seed from my own garden at Leia, from whence I obtained about a maund, which I distributed. The cotton referred to by Lieutenant Paske is the produce of this seed. Last year

Lieutenant Paske got some American cotton seed which was sown in our public garden, and the plants are now in full bearing, which promises to be abundant. I am afraid the experiments I instituted at Leia have not been attended to since I left, and those at Shahpoor will probably terminate in a similar manner whenever I leave the station. In the plants from Seychelles cotton seed, the pods do not fill or ripen well, for which I can give no sufficient reason, for the plants are in appearance very fine, and grow luxuriantly so far as the wood is concerned. The Khurreef crops generally are said to be very good this year. The yield from the cotton plants is much larger than usual."

3. From C. Horne, Esq., Magistrate at Bareilly, giving the result of his sowings of certain kinds of seeds recently received from the Society :—

"Allow me to thank you for the ample quantities of seeds you have sent me, all of which has been greedily absorbed by my constituents. None of the cotton seed has germinated, although every pains have been taken with it, and it has been sown in every kind of soil by the best Zemindars in the district, some of whom take a great interest in the improvement of their estates. All the acclimated peas came up well; but the imported peas, although very fine, and apparently in good order, germinated very sparely. The acclimated beet root grew readily, but proves woody. I am particularly vexed about the cotton seed, as this is the third year of failure. I took great pains to keep the seed from damp, and in good order previous to sowing. I tried this year two maunds of the Kumaon hemp seed, but it did not thrive, it grew certainly but very dwarf, not more than five feet high, whereas in its native teraiee it grows fully ten feet high, with a stem often an inch in diameter. I also imported from other zillahs 80 maunds of wheat which I have distributed all over the district. I shall be thankful (if the Committee would spare the time) for a memo. on the advantages of fresh wheat seed. The fact is acknowledged even by the natives, and I will let you know the result of this experiment. All the seeds subsequently sent by you have germinated well—as also much of the flower seeds. I hope this year to make a good shew.

"I am always ready to try any experiment. And now allow me to thank the Society for the copy of its *Transactions* sent free to the garden, and for the splendid supplies of choice tobacco seed, which have been eagerly sought for by the natives, and the *quality* of the produce of which has been, and is daily appreciated. The Indian corn seed came of *course* too late to sow, but I hope with care to keep it till next year when it may possibly germinate."

4. From Sir A. Bogle, Commissioner of the Tenasserim Provinces, returning thanks for a large supply of horticultural seeds received from the Society at prime cost; also for fruit grafts, &c. :—

"I am exceedingly obliged by the fruit trees," observes Sir A. Bogle, "and the large supply of seeds; the former I have distributed in Moulmain, and of the latter some have been sent to the stations of Tounghoo and Shœy-a-gyeen, Tavoy and Mergui, and about 50 native gardeners have been *supplied in the town of Moulmain and the vicinity, and as they are nearly all* Chinese, I am in great hopes that the markets will this season display such a stock of European vegetables as has never before been seen here. The seeds have been anxiously sought after, for the Chinese are keen gardeners, and I am sure I shall have a great many applications next season. I think it probable that I shall be able next October to distribute about 25 packets, and I will therefore feel obliged if you will put me down for that number, in your arrangements for the season, if I may have as many. I feel quite satisfied that the only means by which I can promote horticulture in my neighbourhood, is by the gratuitous distribution of good seeds, and by noticing in a flattering manner those natives who most exert themselves to raise them, and with the Society's aid I propose following this course until I can discover a better." (Referred to the Garden Committee.)

5. From Major G. L. Cooper, Artillery, Thyet Myoo, Burmah, dated 21st October, tendering his best acknowledgments for the large quantity of agricultural and horticultural seeds forwarded to him :—

" I have distributed them amongst all the parties here who take an interest in gardening, I shall distribute the maize, tobacco and cotton to the natives, also anything else they may fancy, and hope, in a short time, to introduce all the English vegetables. We all feel greatly indebted to the Society for the liberal supply of seeds that has been forwarded, the greater portion of which has vegetated very freely."

6. From the Rev. J. Morgan, intimating, with reference to a previous communication, that he will be shortly prepared to distribute during his approaching tour in the Radnagore district, small quantities of certain descriptions of vegetable seeds, if they can be spared, and promising to communicate the result to the Society.

Resolved—That Mr. Morgan's request be complied with.

7. From J. A. Smith, Esq., Secretary Auckland Museum, offering to exchange the productions of New Zealand for those of India.

Resolved—That Mr. Smith's proposal be entertained.

For all the above communications and presentations, the best thanks of the Society were accorded.

A. H. Blechynden,

Secretary.

REPORT

OF THE

Agricultural and Horticultural Society

OF INDIA.

Report from the Council to the Annual General Meeting, January 9th, 1856.

In submitting their usual Annual Report to the Members, at their present Anniversary Meeting, the Council have the pleasure of announcing that the affairs of the Agricultural and Horticultural Society of India continue to progress satisfactorily.

The number of Members elected during the past year is one hundred: exceeding any year (except 1851,) for the last 14 years: of these 23 are Civilians, 18 Merchants, 26 Military Officers, 6 Medical Officers, 14 Indigo Planters, 6 of the Legal profession, 2 Clergymen, and 5 Native Members of the Community; as will be seen fully detailed in the following classified list:—

CLASSIFICATION.	In 25 former years.	In 1846.	In 1847.	In 1848.	In 1849.	In 1850.	In 1851.	In 1852.	In 1853.	In 1854.	In 1855.	Gross Toual.	Total real number at close of 1855, after deducting lapses.
Honorary Members, ..	11	1	0	1	0	0	0	1	0	1	0	15	9
Associate Members, ..	2	0	0	0	0	1	1	0	0	0	0	4	2
Corresponding Members,	0	1	0	0	0	0	1	1	1	0	0	4	3
Civilians, ...	232	13	15	22	8	10	22	16	18	6	23	385	157
Merchants and Traders,	201	14	12	13	10	14	20	12	5	16	18	335	110
Indigo and other Tropical Agriculturists,	190	15	6	5	1	9	19	13	10	7	14	289	95
Military Officers, ..	160	10	11	11	11	9	34	18	22	19	26	331	158
Medical Officers, ..	80	0	2	3	5	7	4	5	3	4	6	119	31
Asiatics, ...	63	2	14	5	6	9	8	8	8	5	5	133	53
Clergy, ...	14	1	0	0	0	2	1	1	1	1	2	23	8
Law Officers, ...	40	1	0	0	6	4	6	3	1	3	6	70	26
Miscellaneous, ...	9	0	2	0	2	2	6	0	0	10	0	31	22
	1002	58	62	60	49	67	122	78	69	72	100	1739	674

In the lapses referred to in the last column, are comprized twenty deaths, an unusually large number, more than double that of last year; thirty-eight resignations; two whose names have been struck off for non-payment of subscriptions, and ten whose names have been removed from the list, in accordance with Section VI of Chapter III of the Bye-Laws, their absence from India having extended beyond four years: making in all seventy.

Of the above mentioned number (674) 37 are Members who have compounded for their subscriptions; eighty-five are absent from India, and consequently non-paying; and fourteen are Honorary, Associate, and Corresponding Members, in all 136; leaving 538 as the actual number of paying Members at the close of the year, or 17 more than in 1854: the number who have left India during 1855 is greater than usual, and the total number of absentees exceed by fourteen that at the close of last year; but for this the increase in the resident paying list would have been still more satisfactory.

Though the subscription list has been steadily increasing year by year, and the number of new members enrolled in 1855, is, as stated above, greater than usual, still the Council are of opinion that this increase can scarcely be considered proportionate with the increase, during the last few years, in the European population of Bengal and Upper India. The average addition at each monthly meeting in 1855 has been eight, while the losses from death, resignation, and other causes, have been five: this fact, coupled with the experience of the past, tends to prove that there should be, on an average, at least five elections at each monthly general meeting, to prevent a reduction in the subscription list. It may be further noted that the 100 elections that have taken place during the past year, were upon the recommendation of only 56 Members. The Council would take this opportunity to urge their fellow Members, to exercise their individual influence in proposing new names for election: if every Member of the Society would but introduce one friend annually as a Member, they would, by such co-operation, afford the surest means of enabling the executive, not only to maintain the Society in a permanent state of efficiency, but to extend considerably its sphere of usefulness.

The Members who have been lost to the Society by death, are Dr. K. M. Scott, a zealous Horticulturist and contributor to the Society's Garden; Mr. Thomas Leach, who, in former years, before his departure from India, took an active part in the proceedings of the Society; Mr. Thomas Teil, to whom was voted the Society's gold medal in 1846, for the distinterested and useful service he rendered, in zealously prosecuting certain experiments on the tanning properties of the American Sumac, the produce of the H. C. Bot. Garden; Messrs. J. C. Abbott, J. R. Barnes, C. S., Walé Byrne, and J. P. Hermanson; Dr. R. Young; Lieut. G. Eden; Dr. G. B. Oman; Messrs. M. Böse; C. S. Stowell; C. E. Morton; P. Crump; H. E. Brae; R. H. Young; T. C. Morton; N. Faudon; G. C. Cheap, C. S; and Dr. George Tranter.

The Society has also had the misfortune to lose, by his retirement from India, the valuable services of their esteemed and respected President, Sir Lawrence Peel. The address voted to him on the occasion, together with his reply,—both which are recorded in the Proceedings,—shew the extent of the loss the Society has sustained by his return to his native land. This misfortune has been considerably enhanced by the sudden departure from the country of one of the oldest and most popular Members of the Society, Mr. Charles Prinsep, Sir L. Peel's successor in the Presidential Chair. Mr. Prinsep's attention had been directed for many years to Agriculture; and the fund of information he possessed on this, and various other subjects, which are constantly brought to notice at the general meetings, would doubtless have rendered his services truly valuable to the Society. The nature of the malady which obliged him to leave is, unfortunately, such as holds out scarcely any prospect of his return to India.

Pursuing the subject of the internal economy of the Society, the question that next comes under consideration is that of finance. The Council have again to report most favorably on this head, in submitting the usual statements of receipts and disbursements, vested fund, liabilities, and arrears of subscription. The total receipts during the year have been Rs. 25,967-0-2, or Rs. 3,602 more than in 1854, independent of the cash balance of Rs. 1,007-6-11. The disbursements amount to Rs. 25,989-3-10, in which is included the sum of Rs. 2,800 repaid to the Bank of Bengal for a Loan taken in 1854, to meet extraordinary charges. The Vested Fund remains the same, namely Rs. 20,333-5-4. The total liabilities of the Society for seeds amount to Rs. 6,550, or Rs. 2,342, less than last year; to meet this there is the amount due for arrears of subscription, for seeds, grafts, &c., and the cash balance, which form a total of Rs. 9,678-14.

In its Agricultural Department, the Society has not been idle. In addition to the usual importation of Cotton and Tobacco seeds, and their dissemination over the country, it has obtained supplies of foreign flax seed, with the view of introducing a superior description of plant, and encouraging its growth for the sake of its valuable fibre, which has hitherto formed no portion of our exports, the stalks being thrown aside after the seed has been gathered. It has been calculated that 80,000* acres of flax are annually cultivated in India *for the sake of the seed alone,* which, were the stalks turned to account, would produce about 20,000 tons of fibre, yielding, at the rate of £35 per ton, the sum of £700,000, which is, at present, entirely lost to the country. It is proposed to increase the indent of this valuable seed for trial during 1856. Attention has also been turned to the so-called "Chinese Potato," the Yam of Northern China, the *Dioscorea Batatas* of botanists, which has been so successfully cultivated in France and other parts of continental Europe, where it is considered as superior in quality to the common potato, and richer in point of nutritive principles. Through the kind agency of Mr. Fortune, the Society has obtained a quantity of the tubers of this esculent, which has been freely distributed, and will, probably, be easily naturalized in India. The Society has, further, been engaged in procuring supplies of potatoes from California, Madras, and Darjeeling, with a view to the improvement of the stock cultivated in the Cossya hills, which has degenerated considerably: with the same object in view, as likewise for its dissemination over other parts of the country, the Society has ordered from England a quantity of the best description of *seed* of the same valuable root.

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* Perhaps double that breadth of land would be nearer the mark, when we consider how extensively the culture of the plant has increased during the present year. (1855.)

But though the Society has endeavoured by the above, and other measures, to assist to the best of its ability, towards improving the resources of the country, and at the same time to respond, in as generous a spirit as possible, to the applications of members, resident in various parts of India, for large supplies of *Agricultural* seeds; the Council are quite willing to admit that much, very much, remains unaccomplished. Impressed with this conviction, they have recently preferred an application, through the Government of India, to the Honourable Court of Directors, for additional pecuniary aid, with the view of enabling the Society to extend its means of usefulness, and to render its efforts productive, in a greater measure, of public benefit.

While the attention of the Society has been directed to the Agricultural branch, it has not been negligent of its operations in the Horticultural line; but has endeavored, in continuance of former efforts, to promote the improved culture of vegetables, fruits and flowers, by the usual public exhibitions, and by the importation of seeds from foreign countries. Three shows have been held during the year from January to April, the two first in the Auckland Garden, the third in the Town Hall; at which prizes to the extent of Rs. 951 were awarded, viz. Rs. 691 for vegetables and fruits, and Rs. 260 for flowers. The display of flowers was altogether poor, as compared with those of 1852-53; while the show of fruits and vegetables, especially the latter, was fully equal, and, in some respects, superior to previous years; more particularly in regard to three kinds, namely celery, artichoke and asparagus, which have hitherto been but indifferently grown when compared to other sorts of exotic vegetables, most of which are, perhaps, equal to the produce of any part of the world. The Council, having been informed that the numerous silver medals, which have been awarded at these shows for many years past, have been converted into money, have determined that, in future, bronze *medals shall be awarded in place of silver medals, to the Native gardeners, with a prize in money, equivalent to the value of a silver medal.*

It was stated in the last report, that the vegetable seeds from N. America had been the cause of such disappointment, that only one half the usual quantity had been ordered from Mr. Landreth; these, the Council are happy to report, have afforded so much satisfaction, that the usual full supply has been ordered for next season. The consignments of vegetable seeds from the Cape, and flower seeds from England, have likewise been favorably reported on: but the Council regret to add that the trial shipment of vegetable seeds from Messrs. Lawson, of Edinburgh, has proved a complete failure. In stating this fact, the Council are not prepared to say that old seeds were despatched, indeed the character of the respectable firm by whom they were shipped would prevent such a supposition: the failure may have arisen from the seeds not having been packed in tin,* or from the boxes having been placed at the bottom of the hold of the vessel, or from both causes combined. Under any circumstances the failure is to be much regretted, apart from the disappointment it has occasioned, since it has been found by experience that the produce of Scotch and English vegetable seeds is as superior to that raised from N. American seed, as the latter is to the produce of seed from the Cape of Good Hope.

In connection with the Agricultural and Horticultural departments, the Council desire to offer some remarks respecting the Nursery Garden. It is satisfactory to them to record that the quantity of useful and ornamental plants, fruit-grafts and cuttings, distributed during the past twelve months, fully equals that of preceding years, exceeding 11,000, in addition to sugar canes, a large supply of bulbs and tubers, and a quantity of seeds. The amount realized by the sale of fruit-grafts, &c., has exceeded that of *1854 by* Rs. 314-12-6, being Co.'s Rs. *987-6-6*, against Co.'s Rs. *672-10-0.* It is gratifying to state that several of the Chinese plants, which were forwarded by Mr. Fortune during 1854-55, are thriving; more especially the wax-insect tree, a species of *Fraxinus*, which has been increased sufficiently to enable the Gardener to form a small belt of it on the S. W. angle of the garden: an application has been made to Mr. Fortune for a supply of the insect, with the view of ascertaining if it can be domesticated in Bengal. The green dye plant (a species of *Rhamnus*?) and the Hemp palm, a species of *Chamærops*, have also been so largely increased, that though freely distributed, there is still a good stock on hand. The soap-bean tree, the true varnish tree, funereal cypress, *Cryptomeria Japonica*, and several kinds of fruit trees, such as the sweet chesnut, *Citrus japonica*, lemons, pummelows, oranges and peaches, are all doing well; but the *Salisburia*, which Mr. Fortune describes as forming one of the largest timber trees in the Central and Eastern Provinces of China, would not seem, from its stunted and sickly appearance, to be adapted for the climate of Bengal. The orchard ground, which now occupies so large a portion of the nursery, the flower-garden, and the various plots appropriated to arrow-root, tapioca, sugar-cane, Guinea grass, cotton, coffee, Assam rheea, &c., have been duly attended to; while the remaining portion of ground has been closely cropped during the rains with American maize, and certain annual fibrous-yielding plants, such as jute, duncha, Jubbulpore hemp, and *Sidas* of sorts; and during the cold season with peas and flax: of the latter six beegas have been sown with Saharunpore seed, and two with Riga and Dutch seed, for the express purpose of ascertaining the quality of fibre that may be produced from each description of plant. The stock of vanilla plants of four kinds has been much increased; the Manilla hemp plant *(Musa textilis)*, is doing well; as also various bast-yielding plants from Burmah and Arracan, for which the Society is indebted to Major Phayre and Lieut. Ripley.

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* The seeds which the Society receives from North America and the Cape, are invariably packed in well-soldered tin cases, and they seldom fail to germinate, though those from the former country are subjected to as long a sea-voyage as seeds from England. It may here be observed, by way of record, that the partial failure of the seeds sent by Mr. Landreth in 1854, is the first instance that has occurred since he commenced forwarding supplies to the Society in 1839.

The galvanized wire fence, which the Secretary procured last year when in England, (and of which an additional quantity has been recently ordered) has been found so useful, that the Council consider the fact worthy of record; it has not only proved a sure protection against hares for the several tender crops, but has also been the means of saving the sugar-cane and maize plots from the attacks of jackalls, who have hitherto proved so destructive. The receipt of a large supply of bell glasses, also forwarded by the Secretary, has added to the efficiency of the propagating department, as upwards of 8,000 cuttings can now be put down at once, of which at least three-fourths strike, thus enabling the Gardener to raise a large stock of plants, in a comparatively short time, for general distribution.

Before leaving the subject of the Nursery Garden, the Council deem it necessary to offer a few observations respecting the School. It was recorded in the last Report that the accommodation had been enlarged, and an additional school-master appointed, with the view of educating a greater number of boys than had previously been under course of instruction. In the early part of the year a circular was issued in English, Bengali, and Oordoo, stating the precise objects of the institution, and inviting the co-operation of Members in the country, in sending boys to the school, the Society undertaking to provide board and lodging, on the understanding that the boys were bound as apprentices for a term of 5 and 3 years, according to their respective ages. It was further stated in the circular, that the principal object in the establishment of the school, was to train up a body of gardeners in the theoretical, as well as practical branches of their business, who, on the expiration of the period of their apprenticeship, might return to be engaged in their former locality or elsewhere: thereby enabling the Society to meet, in a satisfactory manner, the frequent applications of non-resident Members for this class of servants. The Council regret to be obliged to announce that, as yet, the circular in question has been very partially responded to, a few only having expressed their readiness to assist in promoting the undertaking. The School is, in consequence of this want of support, composed at present of the twelve boys, the children of the neighbouring villagers, who were previously receiving instruction, and six Christian boys from Kishnaghur, who have been recently introduced by the Rev. Mr. Long. To compensate for this deficiency, and as an experimental measure, it is proposed to introduce into the school a certain number of the sons of the Dhangur coolies employed in the garden; these men having expressed their readiness to bring their children from their native country for that express purpose, and to have them bound down as apprentices. The result of the experiment will be communicated in due course. In the mean time the Council hope they may be able to announce, on the next occasion, a goodly addition to the school of lads from the interior, as originally proposed; and it may be added, that orphan boys would, for obvious reasons, be preferable to others.

Among other topics of interest that have been brought to public notice during the past year, through the medium of the Society's Proceedings, the Council would allude, more particularly, to the discovery of the existence of the tea plant in Cachar, communicated by Capt. Verner, the Superintendent of that district: it has been pronounced by Dr. Thomson, to be identical with the Assam plant; and specimens of the preparation submitted by Capt. Verner have been most favorably reported on by two of the Society's members (Messrs. Agabeg and Pereira,) who possess a practical knowledge of the article. Capt V. reports in his last communication to the Society, that several European speculators, encouraged by the above information, have already commenced the cultivation of this valuable plant, and others have recently applied for lands. The Society has also received some interesting particulars from Mr. Fortune respecting the "Green Indigo" of China, accompanied by samples of the dye, which have been forwarded for analysis and report to M. Persoz, the celebrated French chemist, who had previously communicated on the subject to the Academy of Sciences at Paris. Communications on various fibre-yielding plants, with reports on them from the Society's Committee, have been likewise submitted, all tending, it is hoped, to excite a greater degree of interest in these valuable products. The Council desire to allude, more especially, to the assistance rendered under this head, by a valued Member and Correspondent, Lieut. Ripley, Assistant Commissioner of Arracan, who has been indefatigable in bringing to notice the many useful fibres of that province, some of which, though at present little known, may, at no distant day, form good substitutes for more expensive commercial fibrous articles. The above, with papers on cotton, tobacco, silk, Chinese horticulture, and a report from the Secretary giving the result of his enquiries, during his brief residence in England, on the culture and manufacture of flax, and on other useful subjects, will be found in Part I of Vol. IX of the Journal, which has been published during the past year. The Council cannot close this report, without earnestly inviting a more steady co-operation among the Members in the contribution of useful information, either for the Journal, or for the "*Indian Agricultural Miscellany*."* Considering that the Society numbers upwards of 600 subscribers, resident in all parts of India, the amount of literary information which is annually submitted is not so great or so varied as it might be. The Council conclude by expressing their wish that a few more will join the ranks of corresponding members, and contribute the result of their experience in agriculture and horticulture, which can scarcely fail to be alike useful and beneficial to the cause in which, it is to be hoped, all are more or less interested.

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* The *Miscellany* is published in Bengali; the numbers issued to the present time are principally composed of useful matter extracted from the Journal and Transactions: but the Translation Committee will thankfully receive any original matter, which is likely to be useful to the class of readers for whose special benefit the work is published.

Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India from 1st January to 31st December, 1855.

RECEIPTS.

From Members, Subscriptions collected during the year, ...	Co.'s Rs.	16,802 15 0
Government Annual Donation, ...	1,045 0 0	
Ditto, monthly allowance for 12 months at 135-13-6 per month, ...	1,630 2 0	
The Most Noble the Marquis of Dalhousie, annual donation, for the year 1855, ...	500 0 0	
		3,175 2 0
Accruings of in[illegible]n fixed assets, ...		660 4 2
Proceeds of Sugar-cane delivered from the Nursery Garden, including cost of packing, ...	186 0 9	
Proceeds of fruit-tree grafts delivered from the Nursery Garden, ...	801 5 9	
Ditto, of a proportion of surplus Cape, American and Scotch vegetable and English and French flower seeds of 1854-55,	3,565 0 0	
Ditto, of American cotton seeds, ...	21 0 0	
Ditto, of bulbs, of 1854, ...	104 6 0	
Ditto, of copies of *Transactions* of the Society, ...	56 0 0	
Ditto, of copies of *Journal* of do.	80 0 9	
Ditto, of copies of *Indian Agricultural Miscellany*, ...	45 14 0	
Ditto, of old seed boxes and casks, ...	28 1 0	
Members, amount repaid for postages, pots, and packing charges for seeds, &c., ...	256 4 9	
,, Ditto, for glazed cases, &c., ...	76 8 6	
,, Ditto, amount of freight, &c., repaid on boxes of seeds forwarded to their addresses in 1854-55, ...	108 1 6	
		5,328 11 0
Total Receipts, Co.'s Rs., ...		25,967 0 2
By Balance in the Bank of Bengal on 31st December, 1854, ...	698 6 8	
ditto in the hands of the Government Agent, ditto, ...	269 10 6	
ditto in the hands of the Actg.-Secretary on ditto, ...	39 5 9	
		1,007 6 11
Grand Total Co.'s Rs.		26,974 7 1

DISBURSEMENTS.

FOREIGN, VEGETABLE AND FLOWER SEEDS.

By Messrs C. M. Villet & Sons for Cape garden seeds supplied in 1855,	2,044 0 0	
,, Mr. D. Landreth, in part payment of the cost of American garden seeds, &c., supplied in 1854, ...	1,920 0 0	
,, Mr. James Carter, in full of his bill, amounting to £ 280-12 for English flower seeds, &c., supplied in 1854, ...	2,780 4 9	
For the purchase of 10½ Mds. Darjeeling Potatoes, &c., ...	74 0 0	
,, Ditto, of 20 mds. of Madras Potatoes, ...	20 2 0	
		6,838 6 9

LIBRARY.

By Books purchased during the year for the Library, ...	178 12 0	
,, Binding books during the year, ...	28 0 0	
		206 12 0

PRINTING.

,, Sundry parties for printing receipts and schedule of prizes for Flower Shows, &c., &c., ...		76 14 0

JOURNAL.

,, Bishop's College Press, for printing Part 1 of Volume 9, ...		787 11 0

NURSERY GARDEN.

,, Ordinary expences incurred on account of the Nursery Garden from 1st December, 1854, to 30th November, 1855, ...	3,625 5 6	
,, Extra ditto, for purchase of fruit seedlings for grafting, for glazed cases for pots, for widening and repairing roads, and for sundry other contingent expences, ...	839 7 6	
,, Grindlay and Co., to meet the cost of 200 yards of galvanized wire fence, ...	238 12 10¾	
,, G. F. Lackersteen and Co. for supplying 288 pieces of cast iron labels, ...	54 6 0	
,, Mr. C. J. Groom for landing charges on 5 packages of wire fence, &c.	17 12 0	
		4,775 11 10¾

INTEREST.

,, Secy. Bank of Bengal, for Interest on Loan of (Co.'s Rs. 1,800,)		138 12 5

BANK OF BENGAL LOAN.

,, Secretary Bank of Bengal, in full of Loan, (Rs. 3,800,)		2,800 0 0

ESTABLISHMENT.

,, Amount for Establishment from 1st December, 1854, to 30th November, 1855, ...		6,682 15 0

PECUNIARY REWARD.

,, Prizes to Mallees for vegetables and fruits at the Exhibitions held on the 27th January, 26th February, and 12th April, 1855, ...	691 0 0	
,, Ditto to ditto, for flowers at ditto on the 27th January, 26th February, and 12th April, 1855,..	257 0 0	
,, Bhauglepore Branch Society for Annual Donation for 1852-53-54,	150 0 0	
		1,098 0 0

ADVERTISEMENT.

,, Advertising in the Calcutta and Up-Country Newspapers, notices of General Meetings, of Shows of Vegetables and Flowers, Distribution of Seeds, &c., &c., ...		476 1 3

INDIAN AGRICULTURAL MISCELLANY.

,, P. S. DeRozario and Co. for reprinting Part 1, and printing Part 5, Vol. I. of the *Indian Agricultural Miscellany*, ..	140 4 0	
,, Mooktaram Surmo, for translating and revising most of the papers, &c. for ditto, ...	61 0 0	
		201 4 0

STATIONERY.						
, Stationery for Office books, &c., and for the use of the office, ..	59	14	6			
Brown packing paper for packing seeds, ...	92	12	9			
FREIGHT.						
, Freight on boxes of seeds, books, &c , sent and received from the Cape of Good Hope, America, &c., ...				567	9	3½
METCALFE HALL.						
, Society's proportion of Assessment on Metcalfe Hall from November, 1854, to October, 1855,..	131	4	0			
, Modosuden Roy, half of the amount of Society's proportion for a sentry box in the Metcalfe Hall compound, ...	18	12	0			
, Ditto for Society's proportion for inspecting and looking over the Metcalfe Hall Building from April, 1854, to March, 1855,	20	0	0			
, Sundry parties for various articles of furniture,...	72	0	0			
				242	0	0
PETTY CHARGES.						
, Sundry charges, including postage on letters, &c., sent and received, and on copies of the Journal, ...	624	13	0			
, Extra packermen for subdividing seeds, ...	32	13	0			
, Expences incurred in putting up a fence round a portion of the Auckland Circus, for superintending the erection of tents for Flower and Vegetable Shows, &c., ...	191	7	0			
, Presents to Constables for attending at Horticultural and Floricultural Exhibitions during the year, ...	80	0	0			
, Grindlay and Co. for landing charges on a package containing Havana tobacco seed, ...	1	10	0			
, Ditto for ditto on box containing medal Die, ...	12	2	0			
, Government Agent's Commission charges during the year, ...	1	10	0			
				944	7	0
Total Disbursements, Co.'s Rs.,				25,989	3	10
, Balance in the Bank of Bengal on 31st December, 1855, ...	970	10	6			
, Ditto in the hands of the Secretary on ditto, ...	14	8	9			
				985	3	3
Grand Total, Co.'s Rs.,				26,974	7	1

MEMORANDUM.

Disbursements.

To Amount of Disbursements during the year 1855, as per Statement, ...		25,989 3 10
,, Balance in the Bank of Bengal on 31st December, 1855, ...	970 10 6	
,, Ditto in the hands of Secretary on ditto, ...	14 8 9	
		985 3 3
Total, Co.'s Rupees,		26,974 7 1

Receipts.

By Amount of Receipts during the year 1855, as per Statement, ...		25,967 0 2
,, Balance in the Bank of Bengal on 31st December, 1854, ...	698 6 8	
,, Ditto in the hands of Government Agent on ditto, ...	269 10 6	
,, Ditto in the hands of Secretary on ditto, ...	39 5 9	
		1,007 6 11
Total, Co.'s Rupees,		26,974 7 1

Liabilities.

Amount due by the Society for American seeds of 1854-55, ...	Dollars, 1510=3,020 0 0	
Ditto for English flower seeds, of 1855, amounting to, ...	£ 253=2,530 0 0	
Ditto for Scotch vegetable seeds of 1855, amounting to, ...	£ 99-4-6=1,000 0 0	
		6,550 0 0

Dependencies.

Amount invested in Government Securities lodged in the Government Agency Office, ...		20,333 5 4
Ditto of Subscription in arrear, ...	7696 4 0	
Ditto of outstandings for seeds, grafts, copies of Journal, &c., ...	997 6 9	
		8,693 10 9

LIST OF MEMBERS

Agricultural & Horticultural Society

INDIA.

DECEMBER 31*st*, 1855.

ALPHABETICALLY ARRANGED

DISTINGUISHING THE YEAR OF ADMISSION.

OFFICE-BEARERS.

President:

C. R. PRINSEP, ESQ.

Vice-Presidents:

W. HAWORTH, ESQ.
BABOO GOBINDCHUNDER SEN.
W. G. ROSE, ESQ.
BABOO RAMGOPAUL GHOSE.

Secretary and Treasurer:

A. H. BLECHYNDEN, ESQ.

Members of Council:

A. GROTE, ESQ.
C. A. CANTOR, ESQ.
BABOO PEARYCHAND MITTRA.
S. DOUGLAS, ESQ.
BABOO SHIB CHUNDER DEB.
W. BLUNDELL, ESQ.
R. M. THOMAS, ESQ.
B. WARWICK, ESQ.
RAJAH PERTAUP CHUNDER SING.
J. CHURCH, ESQ.

Patron:

THE MOST NOBLE THE MARQUIS OF DALHOUSIE,

GOVERNOR-GENERAL OF INDIA, ETC., ETC., ETC.

List of Members.

* This mark denotes Members who have compounded for their Annual Subscriptions.

† This Mark denotes Members who are absent from India, and therefore Non-contributors.

‡ This Mark denotes Members who though absent, are desirous of continuing their Subscriptions.

The Right Honorable Sir Edward Ryan, A. M., F.A.S., London,	1828
Charles Huffnagle, Esq. M.D., Calcutta,	1837
John Forbes Royle, Esq. M.D., F.R.S., F.L.S., F.G.S., Professor of Materia Medica, King's College, London,	1841
Colonel John Colvin, C.B., London,	1830
J. Mackay, Esq.,	
Don Ramon de la Sagra, Island of Cuba,	
Dr. Justus Liebig, Professor of Chemistry in the University of Giessen,	1843
James Hume, Esq. Magistrate, Calcutta,	1839
Lt.-Col. Francis Jenkins, Commissioner of Assam,	1828

CORRESPONDING MEMBERS.

D. J. Macgowan, Esq. M.D., Ningpo,	1851
Dr. J. V. Thompson, Sydney,	1840
Dr. R. Riddell, Supg. Surgeon, Hydrabad Contingent, Bolarum,	1853

ASSOCIATE MEMBERS.

Mr. Robert Scott, Head Gardener, H. C. Botanic Garden, Calcutta,	1851
Capt. E. P. Nisbet, Commander of the *Nile*,	1843

ORDINARY MEMBERS.

	Admitted.
Abdool Guffar Khazee, Zemindar, Dacca,	1854
Abercrombie, Major Wm., (Beng. Engineers,) Calcutta,	1837
Ackland, George, Esq Merchant, Calcutta,	1853
Ackland, C. J., Esq. Raneegunge,	1855
Adam,† George Ure, Esq. Merchant,	1836
Addington, The Honorable H. R., (74th Regiment N. I.,) Cawnpore,	1855
Agabeg, J., Esq. Merchant, Calcutta,	1854
Agnew, Lieut. Wm., (29th N. I.) P. A. Commr., Assam, Gowalpara,	1853
Ainslie, W., Esq. Civil service, Patna,	1847
Alexander, Henry, Esq. Civil service, Calcutta,	1846
Alexander, Lt. W. R. E., (Ramghur Lt. Infantry), Dorunda,	1850
Alexander,† Lt.-Col. J., C. B.	1851
Alexander, H. A. R., Esq. Civil service, Backergunge,	1855
Allan, James, Esq. Civil Surgeon, Bhaugulpore,	1851
Allardice, Geo., Esq. Calcutta,	1854
Allen, C., Esq. Civil service Calcutta,	1855
Allen, J. H., Esq. Merchant, Calcutta,	1850
Allen, W. J., Esq. Civil service, Chota Nagpore,	1850
Alloowalea,* Rajah of Kapoorthullea,	1853
Anderson, P , Esq. Merchant, Calcutta,	1854
Anderson,† Major W , C. B. (Artillery,)	1847
Andrew, David, Esq. Indigo planter, Aurungabad,	1851
Armstrong,† Major G. C.,	1849
Ashootos Dey, Baboo, Merchant, Calcutta,	
Atherton, H., Esq. Civil service, Sarun,	1845
Auld, S J., Esq. Indigo planter, Surdah,	1846
Baldwin, Major R. H., (Horse Artillery,) Meerut,	1850
Balfour, G. G., Esq. Civil service, Purneah,	1844
Balfour, Lewis, Esq. Merchant, Calcutta,	1842
Balfour, M., Esq. Agent Agra Bank, Calcutta,	1853
Barlow, Sir Robert, Civil service, Calcutta,	1832
Barry, G R., Esq. Serajgunge,	1849
Barstow, Colonel John, (58th N. I.,) Comg. at Jheelum,	1853
Barton, George, Esq. Merchant, Calcutta,	1838
Barwell, Lt. E. W., (13th N. I.,) Hurrianah L. I., Hansi,	1854
Battersby, Arthur, Esq. Indigo planter, Nosibshye, Jessore,	1855
Baugh, Capt. F. W., (26th N. I.) in charge of Elephant Khedahs, Pegu,	1855
Bax, J. H. Esq. Civil Service, Azimghur,	1855
Beadon, C., Esq. Civil service, Calcutta,	1855
Bean, J., Esq. Sub-Deputy Opium Agent, Monghyr,	1850
Beaufort, Francis L., Esq. Civil service, Jessore,	1838
Becher, William, Esq. Gowhatti,	1855

	Admitted.
Beddy, H. W., Esq. Junr. Asst. Commissoner of Arracan,	1855
Begbie, A. W., Esq. Civil service, Agra,	1851
Begbie, C. N. W., Esq. Merchant, Moulmein,	1854
Begg,† Dr. D.,	1850
Bell, J. D. Esq. Barrister-at-law, Calcutta,	1855
Bellairs, F., Esq. Merchant, Calcutta,	1846
Bennett, T. B., Esq. Indigo planter, Purneah,	1854
Bentall,* Edward, Esq. Civil Service,	1837
Berford,† G. Esq. Civil service,	1854
Berkeley, L., Esq. Officiating Sudder Ameen, Roorkee,	1855
Biddle, H., Esq. Mungulpore,	1848
Bindabun Chunder Mittra, Baboo, Calcutta,	1853
Birch,* Major Frederick William, (41st N. I.) Etawah,	1838
Birch, Lieut.-Colonel R. J. H., C. B., Secretary to Government, Military Department, Calcutta,	1841
Bishop, Lt. H. P., (Artillery,) Umballa,	1853
Bivar, Lieut. H. S., (18th Regiment N. I.) Junior Assistant Commissioner, Assam,	1854
Blagrave, Capt. T. C., (26th Regt. N. I.) Punjaub Revenue Survey, Reckna Doab,	1850
Blake, Major Henry, (36th M. N. I.) Thaungoo, Burmah,	1852
Blechynden, R., Esq. Merchant, Calcutta,	1854
Blechynden, A. H., Esq. Secy. Agri-Horticultural Socy. of India, Calcutta,	1851
Blundell, Honorable E. A., Civil service, Penang,	1848
Blundell, Wm., Esq. Merchant, Calcutta,	1853
Boaz, Rev. Dr. T., Calcutta,	1854
Bogle, Lt.-Colonel Sir Archibald, K. C. B., Commissioner of Tenasserim Provinces, Moulmain,	1836
Boileau, C. E. Esq. Civil service, Budaon,	1854
Bourne Walter, Esq. Resident Engineer, E. I. Railway, Monghyr,	1855
Bowers, J. F., Esq. Bamundee Factory, Kishnaghur,	1851
Bowring, Samuel, Esq. Civil service, Dacca,	1843
Boyle, Rev. W. H., Chaplain, Sealkote,	1855
Bracken,† William, Esq. Civil service,	1835
Brae, T., Esq. Indigo planter, Jessore, Hatberria,	1854
Bristow, Capt. J. H., (19th N. I.) Offg. Deputy Commissioner of Mozufferghur, Punjab.	1855
Brodie,*† Major T., (5th Regiment N. I.,)	1836
Brodie, Lt. F. W., United Malwa Contingent, Mehidpore,	1853
Brooke, Captain John C., (63rd N. I.) Commandant Meywar Bheel Corps, and Assistant Political Agent in Meywar, Neemuch,	1843
Brown, Forbes Scott, Esq. Merchant, Penang,	1840
Brown, Lt.-Col. W. G., (H. M. 24th Regt.,) Peshawur,	1852
Buddinauth Bysack, Baboo, Merchant, Calcutta,	1850

	Admitted.
Buller,* Frederick Pole, Esq. Civil service, Furrackabad,	*1837*
Buller, Sir Arthur, Puisne Judge, Supreme Court, Calcutta,	1849
Burkinyoung, J. A., Esq. Solicitor, Supreme Court, Calcutta,	1849
Burlton, Capt. F. M. H., Gwalior Contingent, Augur,	1855
Burnett, Major F. C., (Bengal Artillery,) Meean-Meer,	1839
Burton, John St. Edmund, Esq. Calcutta,	1850
Byng, Hon'ble Capt. R., (62nd Regt. N. I.) Cherra Poonjee,	1852
CALCUTTA, The Right Rev. the Lord Bishop of,	1850
Cameron, Daniel, Esq. Indigo planter, Rajmahal,	1852
Cameron, J. T. D., Esq. Head Master, La Martinière, Cal.,	1853
Campbell, W. F., Esq. Tipperah,	1838
Campbell,* Archibald, Esq. M. D., Medical service, Superintendent of Darjeeling,	1838
Campbell, T. A., Esq. Rajharra viâ Shergotty,	1851
Campbell, Capt. A. M., (16th M. N. I.) Burmah,	1855
Campbell, Capt. Ivie, Assistant Commissioner, Raichoor Doab, Deccan,	1854
Campion, W. G., Esq. Solicitor, Calcutta,	1854
Cantor, C. A., Esq. Merchant, Calcutta,	1851
Carberry, R. J., Esq. Calcutta,	1853
Carew,† R. R., Esq.,	1846
Carshore, Rev. J. J., D. D., Chaplain, Anarkullee,	1846
Carter, J. W. Esq. Merchant, Calcutta,	1843
Carter, T. E., Esq. Calcutta,	1852
Caspersz, H. Esq. Beerbhoom,	1854
Cautley,† Lieut.-Colonel, Sir P. T., (Bengal Artillery,)	1833
Cave, H. S., Esq. Indigo planter, Purneah,	1852
Cavenagh,† Capt. O., (32nd N. I.)	1848
Champneys, Major E. G., (33rd N. I.) Deputy Military Auditor General, Calcutta,	1848
Chapman,† Henry, Esq. Medical service,	1850
Cheap,† Brigr.-Genl. Sir John, K. C. B.,	1841
Cheek, Alfred H., Esq. Civil Surgeon, Benares,	1855
Cheek, George Nicholas, Esq. Medical service, Bancoorah,	1837
Chesney, Lieut. G. T., Engineers, Kurnaul,	1855
Christian, G. J. Esq. Civil service, Etawah,	1855
Christie, Henry, Esq. Cawnpore,	1852
Church, James, Esq. Merchant, Calcutta,	1850
Church, James, Esq. Junior, Merchant, Calcutta,	1851
Clapperton, J. B., Esq. Medical service, Calcutta,	1849
Clark, Dr. Stewart, Civil Surgeon, Allyghur,	1855
Clarke, John, Esq. Calcutta,	1855
Clarke, G. R., Esq. Indigo planter, Roodeipoor viâ Bongong,	1855
Clarke, Longueville, Esq. F. R. S., Barrister, Supreme Court, Calcutta,	1839
Clemen, Edward, Esq. Tobacco planter, Sandoway,	1855

	Admitted.
Cockburn, Wm., Esq. Raneegunge,	*1846*
Colebroke,† Capt. T. E.,	1850
Colvile,* Sir J. W., Chief Justice, Supreme Court, Calcutta,	1849
Colvin, B. J., Esq. Civil service, Calcutta,	1842
Colvin, John Russell, the Hon'ble, Lt.-Gov. N. W. P., Agra,	1837
Comber, Lieut. A. R., (Adjt. Assam L. I.) Deebroghur,	1854
Congreve, Lieut.-Col. G., C. B., (H. M. 29th Regt.) Qr. Mr. General Queen's Troops, Simla,	1848
Cooper, Major G. L., (Artillery,) Thyet-Myoo,	1840
Cooper, J. H., Esq. Calcutta,	1842
Cope, Henry, Esq. Editor of the *Lahore Chronicle,* Lahore,	1847
Corbett, Lieut. Colonel Stuart, C. B., (24th N. I.) Commanding at Wuzeerabad,	1836
Cossinauth Chowdry, Baboo, Cossipore,	1849
Cotton, Brigr. Genl. S. J. (H. M. 10th Regt.) Commanding at Peshawur,)	1855
Courjon, F., Esq. Indigo planter, Chandernagore,	1839
Court, M. H., Esq. Civil service, Allahabad,	1852
Cowell, James, Esq. Merchant, Calcutta,	1838
Cowie,*† Henry, Esq. Merchant,	1837
Cox,† Major-General H. C. M., (58th Regt N. I.)	1838
Cox, J. H. W., Esq. Indigo planter, Kishnaghur,	1845
Craster, Lieut. E. A.‡ Engineers, Gowhatty,	1855
Creswell, C. E., Esq. Calcutta.,	1855
Cumming, William, Esq. Indigo planter, Malda,	1851
Cunliffe,† R. E., Esq. Civil service,	1851
Cunliffe, David, Esq. Civil service, Gya,	1853
Currie, Charles, Esq. Civil Service, Allahabad,	1855
Currie, Edward, Esq. Civil service, Calcutta,	1840
Curtis, Capt. J. C., (Commt. 6th Irr. Cav.) Mooltan,	1853
DALHOUSIE, The Most Noble the Marquis of, Governor-General of India,	1848
Dalrymple,† James, Esq. Indigo planter,,	1846
Dalton, Capt. E. T., (9th N. I.) Asst. Commr. of Assam, Deebroghur,	1848
Dampier, William, Esq. Civil service, Calcutta,	1844
Davidson,† H., Esq.,	1848
Davis, Capt. T., Commt. Police Battn., Booldanah,	1855
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Row, Lieut. W. S., (33rd. N. I.) Balasore,	1854
Rowlatt, Capt. E. A., Principal Assist. Comr. of Assam,	1855
Ruffeeoodeen, Prince Mahomed, Russapuglah, near Tollygunge,	1851
Russell, C. D., Esq. Civil service, Chuprah, Sarun,	1839
Russell, A. E., Esq. Civil service, Tirhoot,	1847
Russell, R. H., Esq. Civil service, Chittagong,	1855
Russickissen Mullick, Baboo, Deputy-Collector, Burdwan,	1847
SAGE, Lieut.-Colonel W., (48th Regt. N. I.) Superintending Engineer, N. E. Provinces, Agra,	1845
Sage, R. P., Esq. Indigo planter, Kishnaghur,	1853
Sagore Dutt, Baboo, Merchant, Calcutta,	1850
Salis, Capt. P., Calcutta,	1854
Samuells,* Edward A., Esq. Civil service, Cuttack,	1836
Sandeman,† Hugh, Esq. Civil service, Allahabad,	1850
Sandes,† M. F., Esq.,	1851
Sandes, Falkner, C., Esq. Solicitor, Calcutta,	1855
Sandys, J. U., Esq. Calcutta,	1855
Sapte,† Brand, Esq. Civil service,	1851
Sarkies, P. J., Esq. Merchant, Calcutta,	1838
Sarkies, S. J. Esq. Serampore,	1855
Savi, John Robert, Esq. Indigo planter, Nohutta, Jessore,	1836
Savi, Thomas, Esq. Indigo planter, Kishnaghur,	1851

	Admitted.
Schiller, F., Esq. Merchant, Calcutta,	1854
Sconce, Archibald, Esq. Civil service, Calcutta,	1839
Scott,† Hercules, Esq. Civil service,	1848
Scott, Dr. D., Medical service, Hansi,	1852
Seymour, S. F., Esq. Admr. General's Office, Calcutta,	1853
Shakespear, Cornet W., (Madras Light Cavy.,) Asst. to Govr. General's Agent, Central India, Maunpore,	1854
Shamachurn Law, Baboo, Merchant, Calcutta,	1855
Shamchand Mittra, Baboo, Merchant, Calcutta,	1854
Sharpe, the Reverend James, Chaplain, Hoshiarpore,	1843
Shawe, M., Esq. Civil service, Sylhet,	1842
Shib Chunder Deb, Baboo, Deputy Collector, Calcutta,	1847
Shib Kissen Banerjea, Baboo, Merchant, Calcutta,	1850
Shillingford, Jos, Esq. Indigo planter, Purneah,	1853
Simpson, H., Esq. Indigo planter, Commidpore, Pubna,	1854
Sims, W. P., Esq. Calcutta,	1851
Simson, D., Esq. Civil service, Leia, Punjab,	1854
Sinclair,† Lieut. J. J. De. C., (Artillery,)	1851
Skinner,† C. Bruce, Esq. Barrister-at-law,	1851
Skinner A., Esq. Hansi,	1854
Skipwith,† F., Esq. Civil service,	1842
Slade, James, Esq. Indigo planter, Tirhoot,	1855
Small,† James, Esq.,	1843
Smith, Samuel, Esq. Calcutta,	1835
Smith,† Edward, Esq. Merchant,	1841
Smith, Lt.-Col. L. H., (Invalids,) Meerut,	1849
Smith, Gow, M., Esq. Indigo planter, Jessore,	1850
Smith, Major E. Fleetwood, (23rd Regt. N. I.) Dacca,	1852
Smith, Jas. White, Esq. Indigo planter, Kattullee, Kishnaghur,	1854
Smyth, Capt. J. H., (Artillery,) Jullunder,	1851
Solano, Rapheal, Esq. Indigo planter, Bullea factory, Dearee, viâ Shergotty,	1855
Sparkes, Capt. T. P., Deputy Commissioner, Rangoon,	1852
Spears, Robert, Esq. Golah Ghat, Upper Assam,	1855
Spottiswoode, Major H., (Commanding 21st Regt. N. I.) Mooltan,	1852
Sreekissen Sing, Baboo, Calcutta,	1835
Stalkartt, William, Esq. Merchant, Calcutta,	1845
Staples,† Capt. N. A., (Artillery,)	1847
Staunton, M. S., Esq. Assistant, Military Auditor General's Office, Calcutta,	1836
Steer, Charles, Esq. Civil service, Calcutta,	1853
Steers,† Thomas, Esq. Merchant,	1852
Stephen, J., Esq. Dacca,	1855
Stevenson,*† William, Esq. Junior, M. D.,	1834
Stewart, Wm., McAdam, Esq. Merchant, Calcutta,	1851
Stewart,‡ C. B., Esq. Merchant,	1854
Stewart, W., Esq. Indigo planter, Dearee factory, Shergotty,	1854

	Admitted.
Stevens, Major, J. Invalid Establist., Deyra Dhoon,	1854
Stiven, W. S., Esq. M. D., Medical service, Moradabad,	1852
Stopford,† Robert, Esq. Merchant,	1848
Story, Brigr. F. P., C. B., Cawnpore,	1854
Strong, F. P., Esq. Medical service, Calcutta,	1827
Strover, Crawford, Esq. Indigo planter, Jessore,	1853
Stuart, James, Esq. Merchant, Calcutta,	1847
Stuart, Robert, Esq. M. D., Calcutta,	1855
Sumbonauth Pundit, Baboo, Pleader, Sudder Court, Calcutta,	1853
Suproshad Baboo, Raj Muntree of Cooch Behar,	1855
Sutherland, Patrick, Esq. Assistant Military Board Office, Calcutta,	1838
Sutherland, Charles J., Esq. Merchant, Calcutta,	1838
Sutto Churn Ghosal, Rajah, Calcutta,	1848
Swatman, Lt.-Col. Wm., (3rd European Regt.,) Agra,	1845
Swinden, T. G., Esq. Calcutta,	1855
Tayler, Lieut. Alexander, (Bengal Engineers,) Punjab,	1853
Taylor, Lieut. F. S., (Bengal Engineers,) Meerut,	1853
Tayler, W., Esq. Civil service, Arrah, Shahabad,	1853
Teil, Thos., Esq. Merchant, Calcutta,	1855
Terraneau, W. H., Esq. Salt. Dept., Calcutta,	1853
Terry, W., Esq. Indigo planter, Midnapore,	1846
Thelwall, Capt. J. B., (H. M. 24th Regt.) Peshawur,	1851
Theobald, W., Esq. Barrister-at-law, Calcutta,	1855
Thomas, R. M., Esq. Solicitor, Calcutta,	1849
Thomas, J. P., Esq. Merchant, Calcutta,	1852
Thomson,† R. Scott, Esq. Surgeon,	1838
Thomson, William, Esq. Merchant, Calcutta,	1848
Thomson, Thomas, Esq. M. D., Supt. H. C. Bot. Garden,	1855
Thornhill, H. B., Esq. Civil service, Eta,	1855
Thornton,† John, Esq. Civil service,	1842
Tonnochy, Thomas, Esq. Deputy Collector, Bolundshuhur,	1833
Travers, Capt. J., (2nd in Command.) Bhopal Contingent, Sehore,	1854
Trevor, Edward Tayler, Esq. Civil service, Calcutta,	1840
Tripp, H. D., Esq. Indigo planter, Salgumedea, Commercolly,	1852
Troup, Major R., (63rd N. I.) Commandant 2nd Oude Local Infantry, Seetapore,	1849
Tucker, Henry Carre, Esq. Civil service, Benares,	1837
Tucker, Henry Carre, Esq. or Secy. for the time being Local Committee, Allahabad,	1851
Tucker, W. T., Esq. Civil service, Monghyr,	1855
Turnbull† Lieut. A. D., (Bengal Engineers,)	1851
Turnbull, G. D., Esq. Civil service, Bolundshuhur,	1853
Turner,*† Thos. Jacob, Esq. Civil service,	1836
Twemlow,† Brigadier George, (Nizam's Army,)	1841

	Admitted.
UTTERSON, Lieut. E. V., (27th Regt. N. I.) Agra,	1854
VARDEN, A. M., Esq. Merchant, Calcutta,	1851
Vetch, Major H., (54th Regt. N. I.) Depy. Commissioner, of Assam, Gowhatti,	1842
Vincent, W., Esq. Indigo planter, Cawnpore,	1846
Vizianagram, Meerza Rajah Vizeram Guzputty Rauze Bahadoor, Rajah of,	1847
Vos, J. M., Esq. Architect, Calcutta,	1847
WALKER, Lieut. Edmond, Engineers, Asst. Principal, Thomason College, Roorkee,	1855
Walker, Alexr., Esq. Merchant, Calcutta,	1855
Wallace, A., Esq. Merchant, Calcutta,	1843
Walters,*† Henry, Esq.,	1836
Ward, J. J., Esq. Civil service, East Burdwan,	1852
Warwick, B., Esq. Calcutta,	1849
Watson,*† Robert, Esq.,	1837
Watson, John, Esq. Merchant, Calcutta,	1852
Watson, Wm., Esq. Merchant, Calcutta,	1855
Watson,† T. J., Esq. Merchant,	1854
Wauchope,† S., Esq. Civil service,	1848
Weskins, Charles, Esq. Merchant, Calcutta,	1854
West, C. H., Esq. Merchant, Lahore,	1850
Western,† Major J. R., (Engineers),	1842
Western, J., Esq. (Horse Artillery) Bangalore,	1849
Whampoa, Mr., Merchant, Singapore,	1850
Wheeler, Lieutenant G. R., (1st Regt. N. I.) Peshawur,	1853
Whitelock, T. W., Esq. Surgeon, (3rd Regt. Hydrabad Contingent,) Bolaram,	1852
Wienholt, W., Esq. Merchant, Calcutta,	1848
Wight,*† Robert, Esq. M. D., Madras Medical service,	1836
Wilby, G. R., Esq. Editor of the *Lahore Chron.* Lahore,	1851
Williams, Fleetwood, Esq. Civil service, Bareilly,	1840
Williamson, Lieut. James, (49th Regt. N. I.) 5th Regt. Punjab N. I., Bunnoo,	1849
Willock, H. D., Esq. Civil service, Eta,	1855
Willis, Joseph, Esq. Merchant, Calcutta,	1827
Wilson, A. G., Esq. Deputy Magistrate, Gyah,	1847
Wilson, Thomas, Esq. Deputy Opium Agent, Ghazeepore,	1848
Wilson, H. R., Esq. Deputy Collector, Budaon,	1852
Wilsone, C. M., Esq. Indigo planter, Munglepore,	1853
Wingfield, C. J., Esq. Civil service, Bijnore,	1855
Wingrove,† E., Esq. Merchant,	1846
Withecombe, J. R., Esq. Civil Asst.-Surgeon,	1851
Wood, J. N. T., Esq. Merchant, Calcutta,	1854
Wood,† Dr. Andrew, Medical service,	1852
Wright, H., Esq. Shahpore, Punjab,	1854

	Admitted.
Wyatt, G. N., Esq. Indigo planter, Champarun,	1848
Wyld, Capt. W., (4th Lancers,) Umballah,	1851
Wylie,† Macleod, Esq.,	1844
Young, G. L., Esq. Indigo planter, Midnapore,	1845
Young, Capt. C. B., Engineers, Civil Architect, Calcutta,	1855

UNIVERSAL LIFE ASSURANCE SOCIETY.

ESTABLISHED IN LONDON AND CALCUTTA, 1834.

Confirmed by Special Act of Parliament 6 *William IV. Chapter* 64.

Invested Capital £630,000, of which 46 Lacs of Rs. are held by the Indian Branch.

London Office, No. 1. *King William Street.*

Chairman.—SIR HENRY WILLOCK, K. L. S.

Indian Branch.

Directors.

SEP, ESQ.
ALEXANDER WALLACE, ESQ.
W. H. SMOULT, ESQ.
GEORGE BARTON, ESQ.
*CECIL STEPHENSON, ESQ.

Physician.—ALLAN WEBB, ESQ. M. D.

Agents and Secretaries.—MESSRS. BRADDON AND CO.

Madras Agents.
MESSRS. BAINBRIDGE & CO.

Bombay Agents.
MESSRS. LECKIE & CO.

1.—The marked success which has attended the operations of this Society, justifies the Directors in calling the attention of the public to the peculiar advantages held out by this Institution to all classes desirous of effecting assurance upon lives.

2.—The Tables of premium have been framed with the greatest care. Those applicable to Indian lives have been especially prepared from the experience of Indian mortality, and from the records of the East Indian Government, and are as moderate as is deemed consistent with perfect security.

3.—Proposals are received for Insurances for the whole term of life, either on a *participating scale*, or on a *non-participating scale at a lower rate of premium.* Also for short periods varying from one to seven years on *very moderate terms.*

4.—An annual division is made of one-fifth of the ascertained profits of the five preceding years, the other four-fifths being set apart to enter into the average of succeeding years.

5.—Of the sum annually divisible, *seventy-five per cent.* is apportioned to policy-holders on the participating scale, who have paid six annual premiums, and these profits can be applied either in reduction of subsequent premiums, or as a bonus to the original amount of the policy. The remaining *twenty-five per cent.* of the profits is apportioned to the shareholders.

7.—The following table will shew the result of the last division of profits as declared on the 10th May, 1855.

Age.	Date of Policy.	Sum Assured.	Original Annual Premium.	Reduction.	Reduced Annual Premium.
		Co 's Rs.	Co.'s Rs.	Co.'s Rs.	
20	on or before the 10th May, 1850.	10,000	420	168	252
30		10,000	480	192	288
40		10,000	590	236	354
50		10,000	740	296	444
60		10,000	1,030	412	618

8.—The following is an Extract of the rates of premium for short term Policies and for Assurances for life *without* participation in profits.

ANNUAL PREMIUM FOR ASSURANCE OF RUPEES 1,000.

Civil.

Age.	1 year.	3 years.	5 years.	7 years.	Life without profits.
20	22	22	23	24	32
30	27	28	28	29	39
40	32	32	32	33	49
50	38	40	40	43	62
60	51	52	56	60	88

Military.

Age.	1 year.	3 years.	5 years.	7 years.	Life with out profits.
20	26	27	28	28	36
30	32	32	33	34	45
40	39	40	40	40	53
50	45	46	47	48	64
60	56	57	60	64	90

9.—On return of Assurers to Europe for a permanent residence, their premiums are immediately reduced to the English rates, both on the *participating* and *non-participating* scales.

10.—Military Officers holding civil appointments are allowed to subscribe at the civil rates of premium.

11.—Premiums are payable either annually, half-yearly, or quarterly, and a grace of 28 days is allowed for such payments.

12.—Medical referees are remunerated by the Society.

13.—At the period of last annual valuation, the Assets of this Society were ascertained to be upwards of £630,000. The amount of Policies in force about £2,000,000, and the annual income arising from premiums thereon £90,000, exclusive of interest on the invested capital.

BRADDON AND CO.

CALCUTTA, *April*, 1856. *Agents and Secretaries.*

Indian Rates of the Universal Life Assurance Society.

TABLE NO. 1.—CIVIL SERVICE.

Annual Premiums required for the Assurance o 1,000 Rs. for periods from One to Seven years, o the Lives of persons in the H. C. Civil Service, an others not exposed to the hazards of Military an Maritime occupations, *without participation* in th Profits of the Society.

Age.	One year.	Three years.	Five years.	Seven years.
18	21	22	23	23
19	22	22	23	24
20	22	22	23	24
21	22	23	24	24
22	23	24	24	24
23	23	24	24	25
24	24	24	25	26
25	24	24	25	26
26	24	25	26	27
27	25	26	27	28
28	26	27	28	28
29	27	28	28	28
30	27	28	28	29
31	28	28	29	29
32	28	29	29	30
33	28	29	30	30
34	28	29	30	31
35	30	30	31	31
36	30	30	31	32
37	31	31	32	32
38	31	32	32	32
39	32	32	32	32
40	32	32	32	33
41	32	32	33	34
42	32	32	34	35
43	33	34	35	36
44	34	35	35	36
45	34	35	36	38
46	35	36	36	39
47	36	36	38	40
48	36	37	39	40
49	37	39	40	42
50	38	40	40	43
51	40	40	42	44
52	40	42	44	45
53	42	44	44	47
54	43	44	46	48
55	44	45	48	48
56	45	47	48	50
57	46	48	50	52
58	48	50	52	54
59	49	51	54	56
60	51	52	56	60

TABLE NO. 2.—MILITARY AND NAVAL.

Annual Premiums required *for the* Assurance of ,000 Rs. for periods from One to Seven years, on he Lives of persons exposed to the hazards of Military and Maritime occupations, *without parti-ipation* in the Profits of the Society.

Age.	One year.	Three years.	Five years.	Seven years.
18	25	25	26	27
19	26	26	27	28
20	26	27	28	28
21	27	28	28	28
22	28	28	28	29
23	28	28	29	30
24	28	28	29	30
25	28	29	30	31
26	29	30	31	32
27	29	30	31	32
28	30	31	32	32
29	31	32	32	33
30	32	32	33	34
31	32	33	34	35
32	32	34	34	36
33	33	35	36	36
34	34	36	36	37
35	35	36	37	38
36	36	36	37	38
37	36	37	38	39
38	37	38	39	40
39	38	39	40	40
40	39	40	40	40
41	40	40	40	41
42	40	40	41	42
43	40	41	42	43
44	41	41	43	44
45	42	42	43	44
46	43	43	44	44
47	43	44	44	45
48	44	44	45	46
49	44	45	46	48
50	45	46	47	48
51	46	47	48	49
52	47	48	49	50
53	48	49	50	52
54	49	50	52	52
55	50	51	52	53
56	51	52	53	55
57	52	53	55	56
58	53	55	56	58
59	54	56	58	60
60	56	57	60	64

, *Premiums are received in half-yearly payments for the convenience of the Assured, but in case of lapse the full premium of the current year will be charged.*

• Table No. 1. Example.—A person aged 30, may, by paying 27 Rs., secure 1,000 Rs. to his representatives, if his death should occur within *one* year; if within *five* years by paying 28 Rs. annually, and if within *seven* years, by paying 29 Rs. per annum.

Table No. 2, Example.—A person aged 30, may by paying 32 Rs. secure 1,000 Rs. to his representatives, if his death should occur within *one* year; if within *five* years by paying 33 Rs. annually, and if within *seven* years by paying 34 Rs. per annum.

UNIVERSAL LIFE ASSURANCE SOCIETY.

WHOLE LIFE.

Age	CIVIL.		MILITARY AND NAVAL.		ENGLISH RATES.		Age
	TABLE No 3. Annual Premiums required for the Assurance of 1,000 Rs. with participation in profits, and reduction of Premium on return to Europe	TABLE No. 5. Annual Premiums required for the Assurance of 1,000 Rs. *without participation in profits, but with reduction of Premium on return to Europe*	TABLE No. 4 Annual Premiums required for the Assurance of 1,000 Rs. with participation in profits, and reduction of Premium on return to Europe.	TABLE No. 6 Annual Premiums required for the Assurance of 1,000 Rs. *without participation in profits, but with reduction of Premium on return to Europe.*	Annual Premium for assuring £100, for the whole of life, with participation in profits. Inserted as a guide to persons insured in India under Tables Nos. 3 and 4.	Annual Premium for assuring £100, for the whole of life, without participation in profits. Inserted as a guide to persons insured in India under Tables, Nos. 5 and 6.	
18	41	31	45	34	1 17 2	1 13 6	18
19	42	32	46	35	1 17 11	1 14 2	19
20	42	32	47	36	1 18 8	1 14 10	20
21	43	33	48	37	1 19 6	1 15 7	21
22	43	34	49	38	2 0 5	1 16 5	22
23	44	35	49	39	2 1 4	1 17 3	23
24	44	36	50	40	2 2 3	1 18 1	24
25	45	36	51	41	2 3 3	1 19 0	25
26	46	37	51	42	2 4 4	1 19 11	26
27	46	38	52	43	2 5 5	2 0 11	27
28	47	38	53	44	2 6 7	2 2 0	28
29	48	39	54	45	2 7 8	2 2 11	29
30	48	39	54	45	2 8 10	2 4 0	30
31	49	40	55	46	2 9 11	2 5 0	31
32	50	41	56	46	2 11 0	2 5 11	32
33	51	42	57	47	2 12 3	2 7 1	33
34	52	43	58	47	2 13 7	2 8 3	34
35	53	43	58	47	2 14 11	2 9 6	35
36	54	45	59	49	2 16 5	2 10 10	36
37	55	46	60	50	2 18 0	2 12 3	37
38	56	47	61	51	2 19 7	2 13 8	38
39	58	48	62	52	3 1 3	2 15 2	39
40	59	49	63	53	3 3 0	2 16 9	40
41	60	51	64	54	3 4 9	2 18 4	41
42	62	52	65	55	3 6 6	2 19 11	42
43	63	53	66	56	3 8 3	3 1 6	43
44	65	54	68	57	3 10 2	3 3 2	44
45	66	55	69	58	3 12 2	3 5 0	45
46	67	57	70	60	3 14 5	3 7 0	46
47	69	58	72	61	3 16 9	3 9 1	47
48	70	60	73	62	3 19 4	3 11 5	48
49	72	61	75	63	4 2 3	3 14 1	49
50	74	62	77	64	4 5 6	3 17 0	50
51	76	65	79	67	4 9 1	4 0 3	51
52	79	68	81	70	4 12 10	4 3 7	52
53	81	71	83	73	4 16 11	4 7 3	53
54	84	74	86	76	5 1 2	4 11 1	54
55	87	76	89	78	5 5 10	4 15 3	55
56	89	79	91	81	5 10 10	4 19 9	56
57	92	81	94	83	5 16 2	5 4 7	57
58	96	84	98	86	6 1 10	5 9 8	58
59	99	86	101	88	6 7 7	5 14 10	59
60	103	88	105	90	6 13 2	5 19 11	60

⁂ *Premiums are received in Half-yearly payments for the convenience of the Assured, but in case of lapse, the full premium of the current year will be charged.*

In the event of the parties whose lives are assured returning to reside permanently in Europe, they will be reduced to the English rates from the date when their premiums first fall due after arrival.

Parties visiting England *on Furlough* or for a *temporary residence* will be required to pay the Indian premium during residence in England, without reference to the number of years the same may previously have been paid in India.

Parties assured in Company's Rupees in India, who may determine on paying their future premiums in England will be required to pay them at the fixed rate of Exchange of Two Shillings per Company's Rupee; and in the event of such assurance becoming a claim payable in England, the sum assured will be paid at the same fixed rate of Exchange of Two Shillings per Company's Rupee.

THE JOURNAL

OF THE

Agricultural & Horticultural Society

INDIA.

Cachar; its Inhabitants, and its Products: by Lieut. R. STEWART, *(22nd Regt. B. N. I.) Commandant of the Kookie Levy.*

The province of Cachar lapsed to the British Government little more than twenty-five years ago. Its revenue when we took possession was about Rupees 30,000; it now amounts to one lakh, and is daily increasing. This increase is not attributable to a higher rate of assessment being thrust upon the people, but to the spread of cultivation and to the multiplication of the population, both by immigration and the fostering care of good Government. Indeed, the land rent, the principal source of the revenue, is but half that demanded by the late Rajahs, and averages only a shilling an acre! These facts are significant of a prosperity which is rarely to be met with in India, and as Cachar has now become, owing to the discovery of the tea tree growing indigenously in its jungles, a field for the display of European enterprise, and for the employment of European capital in the cultivation of the same, it may perhaps be useful to the public to be possessed of the result of a few years' experience, in the shape of a slight account of the country, its inhabitants, and its products.

Cachar Proper, lying between the 23rd and 25th degrees of latitude, North, and the 91st and 93rd degrees of longitude, East, is bounded on the North by Assam, on the East by the independent state of Munipoor, and on the West by the district of Sylhet. On the South the frontier is undetermined, extending as far as it may be expedient to push it towards the hunting grounds of a savage and independent Indo-Chinese tribe called the Lhooshais, who inhabit the hilly country lying between the province and Chittagong. The true area of the district cannot therefore be correctly calculated, but, as things stand, may be estimated at about 5000 square miles. This is very unequally and irregularly divided into Twenty-two Pergunnahs, viz.

1. Barākpār,
2. Chuttla Hour,
3. Hylakandy,
4. Sēraspoor,
5. Phoolbāree,
6. Kātee Ghurra,
7. Hurree tēkur,
8. Libār pottah,
9. Jellalpoor,
10. Goomrah,
11. Kalain,
12. Bickrampore,
13. Juttrapoor,
14. Rājnuggur,
15. Jainuggur,
16. Burkhōla,
17. Oodhārbund,
18. Bānskāndy,
19. Luckipoor,
20. Roopai-bulli,
21. Bundrāj,
22. Sonapoor.

Of these Chuttla Hour is the greatest in extent, the least cultivated, and the chief locality of the tea plant: Hylakandy is the second in size, and the first in extent of cultivation, yielding near one-third of the entire revenue of the whole district: and Barākpār is the first in consequence, containing the Sudder Station, and being the head-quarters of the troops. The Pergunnahs are divided into mozahs or villages, these again are formed not of houses placed close together in a row, as the word would lead one to imply, but of clumps and lines of habitations, each in the midst of its own cultivation, and surrounded by enclosures, and groves of trees.

The soil of Cachar is a rich alluvial one, formed from the washings of the mountains which surround it on three sides. The country is drained by the river Barāk or Soorma, which runs in a most tortuous course through the whole of it from East to West. So winding, indeed, is this stream, that with the aid of one or two small but navigable tributaries, it places almost every arable part of the district within the influence of water carriage. The river itself is navigable throughout the year to boats of a draught not exceeding four feet, and in the rains vessels of any tonnage might be brought up. The banks of the Barāk are the highest parts of the plain country, and are about 200 feet above the level of the sea. The ground slopes inland from the banks for several miles, and then gradually ascends towards the foot of the hills on either side, leaving a long line of jheels and swamps, many miles in area, between the river and the mountains. In the cold season the bed of the stream is about thirty feet below the top of the banks, but in the rains the waters overflow the banks and inundate the low tracts that lie between them and the mountains, carrying with them a rich alluvium, which is deposited to such a considerable extent that many of these jheels are being gradually filled up. Vast tracts of land have in this manner been reclaimed from marsh, nature being assisted in the operation by means of small canals, cut so as to admit the waters of the river directly to the spot required. In some seasons the deposit is upwards of a cubit in depth, and four or five inundations serve to make places only valuable as fisheries into smiling paddy fields.

Low ranges of hillocks, called locally *teelahs,* intersect the country in many places. They lie chiefly at right angles to the river, and in two or three places terminate in the stream itself. The soil of these ranges is a red clay, resting on a base of conglomerate, which in many places lies still exposed. Conglomerate also lies beneath the soil of the plains, and is frequently met with in the bed of the river.

The geology of Cachar has never been scientifically investigated, and its mineral resources are unknown. Forming, as the mountains to the North of the province do, however, a continuation of the same range as that of the Cossiah and Jynteah hills, where lime, coal, and iron abound, it may be supposed that like treasures are deposited in them. But none have hitherto been discovered the quantity or quality of which promise profit in working. In several parts, both of the plains and the hills, brine wells ooze out of the earth, the water of which yields a small percentage of salt. They are leased out by Government for a few hundred Rupees a year.

The low ranges of hillocks or *teelahs* are covered over with dense tree forests intermatted with cane and creepers, and it is here that the tea plant is found growing in the greatest luxuriance. The greater portion of the timber on these hillocks is soft and useless for any purpose save fire-wood, other localities however produce excellent wood, extensively used for boat-building, &c. The tea tree itself has long been known to the natives as a timber, and is called by them the *dullicham*, or white wood, from the light color of its bark; it was used as posts for houses, and is considered a hard, durable wood.

It must be remarked that the tea tree has not up to the present moment been discovered growing on any of the ranges of *teelahs* to the north of the river, although the soil of these is precisely similar to that of those on the South. This local dispersion has made some think that the plant is not really indigenous, but was introduced by some former inhabitants of the country. The questions naturally arise, who were these inhabitants? and why should they not have planted on the North as well as on the South of the river? and they remain unanswered. It is difficult to account for such a capricious disposition, but I am not convinced that it really exists; sufficient search has not yet been made in the forests. Those planters who have already commenced work have been only too glad to secure the lands to the South, where the tree is known to abound, without incurring the labour of research in localities where it is reported not to exist. The mere fact of its non-existence, moreover, is no proof that it will not grow, as it is averred by some. The soil of the *teelahs* to the North of the Barāk is identical with that on the South, and they are subject to the same meteorological influences. Thousands and thousands of acres of land are therefore still available to those who may wish to enter into the speculation.

The prevailing jungle of the plains is not tree jungle like the *teelahs*, but composed of huge grasses, such as *khas*, *eekur*, *tera*, and others, together with reeds of various kinds.

The gorges leading up to the mountains abound with bamboos, and the mountain ranges themselves are surmounted by extensive forests of timber interspersed with gigantic bamboos.

Cachar is a non-regulation Province, and is presided over by a Superintendent, who exercises both fiscal and magisterial powers. The Collectorate is attached to the Dacca Commission, and Sessions cases are tried by the Judge at Sylhet, appeals in Civil suits being open to the Sudder. Two Native Judges or Moonsiffs assist the Superintendent, and have jurisdiction in small causes. One resides at the Sudder Station, and the other at Kātee Ghurra. The troops located in Cachar consist of a detachment of about 200 of the Sylhet Light Infantry Battalion, and of the Kookie Levy, a civil corps, 200 strong. These are for the most part detached in small guards, which are stockaded in different posts on the frontier, both to the North and South, and serve to check marauding parties of Shooshais and Angamie Nagas.

The population of Cachar is about 125,000, and consist of several races. The Cacharees, the original proprietors of the soil, were long since driven Northward by invasion, oppression, and other political causes, and are now chiefly to be found in Assam, and in the hills between the Berhampooter and the Soorma. There are however several villages of them still to be found in the province, chiefly in the Northern pergunnahs. They profess Hindooism, corrupted by many superstitions peculiarly their own, and are an exclusive and somewhat aristocratical people, holding themselves aloof from, and considering themselves independent of all others. The Cacharees speak a language of their own, quite distinct from Bengalee, and are a stout, sturdy, industrious people, supposed to be of the aboriginal stock of Hindostan.

The Cacharees gave place to Bengalees, both Mussulman and Hindoo, who now form about one half of the entire population. These are much the same, only more unsophisticated than the inhabitants of other parts of Bengal. The germs of the same litigiousness, chicanery and mendacity are apparent among them, and it is to be feared will sprout as wealth and civilization advance. They speak a patois almost unintelligible to Lower Bengal; and are at present, as a people, both morally and physically, superior to their brethren in the West. The vice of opium-eating is however gaining ground among them, and it will not be long ere the demoralizing effects of this custom will be severely felt. The cultivation of the poppy in the district is interdicted, and it is therefore improbable that the vice will spread to such a woful extent as it has done in Assam, where each household has a bed of the poison growing in its garden, where not only men, but women and children from the tenderest ages, acquire the habit of eating it, and where every step towards progress and improvement is impeded by the universal lethargy superinduced by the consumption of the noxious drug. But the increasing sale of opium in Cachar is alarming, and ought to be considered. Now that wealth is being poured into the country, and distributed chiefly among the laboring classes, the increase is likely to continue, and extend to the very portion of the population upon whom the future prosperity of the country depends.

In addition to the Bengalees, as inhabitants of the plains, there are the Munipoories, an enterprizing and active race of Chinese origin, who have emigrated from the valley of Munipoor, or have been driven thence by oppression. They are a fair complexioned people, with strongly marked Tartar countenances, clean and well-looking, physically much superior to the Bengalee, but with a moral standard not much higher. They are famous for plotting and intrigue. Their women have the same reputation for beauty in Eastern Bengal as the Cashmerians have in Upper India, but they lay claim to greater merit in their indefatigable industry. The Munipoorie woman has no shame-facedness. No laws confine her in a harem, and her sphere of action is not limited by the purdah. She is as perfect a housewife as the helpmate of any farmer in England. She not only superintends all domestic arrangements, but makes clothes for the whole of her family from the raw cotton. She assists her husband in the field, and carries her surplus manufactures, or the produce of her own garden, to the market. The Munipoorie himself considers it effeminate to meddle with household matters, or indeed to put his hand to any thing but the cultivation of his fields. The paddy reaped, he lounges about in idleness, or amuses himself on horseback, while his wife beats the grain from the husk, and cooks it for his dinner. The Munipoories are a military race, and recruit the ranks of the local battalions in Assam, Sylhet, and Arracan, in considerable numbers. Several Princes of their Royal family reside in banishment in Cachar, and the turbulent ambition of these men is the source of constant plotting and intrigue among their countrymen in the province, for the purpose of subverting the present dynasty of their native valley. Numerous invasions of Munipoor have been concerted in and put into execution from Cachar, but the determined face set against these expeditions by our government has of late caused them to be more infrequent. The Munipoories are entitled to consideration as being the pioneers of cultivation in Cachar. They settle in the densest jungles, beyond the utmost limits of human habitation, and push their clearings to the South with great energy. Their dislike to rent-paying was at first such, that as soon as the one thousand days of rent-free tenure allowed to squatters on waste lands had elapsed, they would abandon their clearings—their places being eagerly sought by Bengalees—and settle again on new grants further removed. Grown wiser now, they either remain as permanent settlers, or sell their old lands to clear new. The Munipoories are proselyte Hindoos of not more than a hundred years standing. They are not by any means orthodox in their faith, but practice cleanliness and temperance, the two greatest virtues enjoined in their adopted religion. They exceed only in eating pān and betel-nut. They speak a language of their own, very similar to that of the Kookies, their ancient customs are however more assimilated to those of the Nagas, and tradition pronounces them to be descendants of two powerful tribes, the one Kookie and the other Naga, who after having disputed possession of the valley of Munipoor for many years, at length lapsed into one, and formed a single nation.

About one quarter of the entire population of Cachar is made up of Munipoories. The remaining fourth consists of tribes of Kookies and Nagas, who inhabit the hills on the frontiers of the district, and gain their living by clearing the jungles on the slopes, and raising small crops of rice and cotton. Of these tribes, and their method of cultivation, some account will be found in a recent number of the

Asiatic Society's Journal, in an article entitled "Notes on Northern Cachar;" it will be unnecessary therefore to recapitulate in this paper; I will remark however, that both Nagas and Kookies are excellent material for labor, and will eventually, I feel assured, prove invaluable aids in the cultivation of the tea plant. Their own method of agriculture is not dissimilar to that forced on the tea planter. They are in the yearly habit of clearing jungles of the same nature for their own fields as he has to clear, and they have in like manner to keep them weeded. They are therefore much more expert in handling the axe and the hoe than either Bengalees or Munipoories, who effect their purpose more with the plough. Being moreover an outcast race, despised by both Mussulmans and Hindoos, by reason of their nonconformity in faith, their filth, and their minority in numbers, and, gaining as they do but a scanty and precarious living by their own poor cultivation, they are more likely to appreciate the wages, which, regularly given, will introduce them to comfort and consideration. Those tea planters will do well, who by conciliation or diplomacy can secure the services of many of this class of the inhabitants. Nor will they find it an easy task to do so. Situated as these tribes are, they are jealous of the interference of Bengalees and others, who domineer over them, and who seldom have dealings with them save when the issue is unspeakably to their own advantage. The planter should therefore negociate in person, for rude though these people be, they have implicit faith in the word of the white man. His system should not be, at first, the exaction of pledges, but rather a display of confidence in making liberal advances and presents, and making them too with a degree of delicacy, the omission of which might not indeed be felt by a more civilized race, but which will meet with high appreciation from these savages. The object of his endeavor ought to be the settlement of a clan, or portion of a clan on his own grant, either for the purpose of cultivating on their own account such lands as may not be immediately wanted by himself, on the condition of supplying periodical labour, or their settlement as regularly paid permanent labourers, not carrying on cultivation of their own, but trusting to the market for their subsistence. Both these plans might be effected, and either would be productive of great advantages. In the first instance, the land cleared by the squatters for their own cultivation, could next year, when abandoned by them, be made available for tea, and a saving of the whole expenses of clearance (no small item in tea cultivation) be thus effected, and in the second, not only the men, but the women and children being secured for the cultivation and manufacture, is no mean consideration. A few, but a very few, Kookies and Nagas, and these chiefly the rifraff of the tribes, have already been induced to labour in some of the tea gardens, and their efficiency has verified my long conceived opinions. They are rated as being able to do double the amount of work performed by an equal number of Bengalees.

The climate of Cachar is a very temperate one for Bengal, the thermometer in the shade rarely if ever rising above 93° or 94° in the hottest weather of July and August. The rains cease in November, and the cold season is marked by an extreme dryness, which parches and cracks the ground to a considerable depth below the surface. A few light showers fall about Christmas time, but the dryness continues till April. During the cold weather a thick fog envelopes the land in the night, and is dispelled by the sun at eight or nine o'clock in the morning, often later. It slowly rolls away towards the hills, ascends them, and clings about their peaks in a condensed form during the day, precipitating itself again in the evening when the sun has disappeared, and acquiring volume as it descends. April and May bring violent storms, North-westers, and showers of rain and hail, but the rains do not regularly set in until June.

The fall averages under a hundred inches, yet the climate is a damp one. The flatness of the ground allows of no natural drainage, and a vast surface of water is in consequence exposed to evaporation. The air is heavily charged with moisture, vegetation becomes rank, and fungus and mildew cover all articles that are not constantly looked after.

Notwithstanding all this, Cachar is by no means an unhealthy country. In comparison with all the other districts of Bengal, nay of India, I should say it bore away the palm for general salubrity. Fevers of a malignant nature are very uncommon, neither are diarrhœa nor dysentery very prevalent. The inhabitants appear more subject to rheumatism than any other grievous malady, and many are carried away by affections of the lungs. Cutaneous diseases are most rife, almost every individual of the lower classes, being covered with huge patches of ring-worm or itch.

Cholera and small pox, those scourges of humanity, do not fail to make periodical visits, and hardly a year passes without great mortality being caused by one or both of them. But in this Cachar is no worse than any other place in India. Cholera is heralded by its appearance in Sylhet, from which it slowly passes on to the Eastward, decimating the population as it goes. It is most capricious in its course, often skipping over many villages in which not a single soul may be attacked, while in the neighbouring ones they are dying by hundreds. From Cachar it generally passes over into Munipoor. The Natives appear to have no cure or specific for the disease, but sink from it one after the other in the space of a few hours after the attack, without an effort to save themselves. The ravages of small pox, are also terrific. All faith in the virtue of vaccination has been lost, owing to the deterioration of the matter, which when it reaches Cachar, has not only lost its saving quality, but actually produces a form of disease not differing much from small-pox itself, and which is in itself dangerous, and not lightly got rid of, leaving its marks upon the skin. Neither cholera nor small-pox remain more than three months at a time, and their visitations take place just before the rains.

A stranger travelling through Cachar is at once struck with the air of neatness and comfort pervading the habitations of the people. The houses are nowhere crowded together as in a city, but are built widely separate, each surrounded by its own enclosure, and protected from sun and wind by groves of bamboos, plantains, betelnut, mango, guava, and other fruit trees, having generally close to it a small piece of ground as a garden for rearing pot-herbs. The houses are all built on a frame work of posts, with walls either of a coarse bamboo matting, or of reeds plastered over with mud and cow-dung, and thatched with grass. The ground is considerably raised for a floor, earth being taken from a ditch which is dug round the enclosure or from a tank made within. The Bengalee builds his house with gable ends, and a highly curved ridge-pole: the Munipoorie with a straight ridge pole and sloping gables. These villa-like dwellings stretch almost in continuous lines, on both sides of the river from West to East of the district; lines of them branch off inland here and there, and clumps of them are thickly strewn at the foot of the hills to the North. The banks of two nullahs in Hylakandy, called the Khuttla Khāl, and the Dullēsur, flowing from the South, are lined with them for many miles in that direction, and indeed wherever a piece of high ground in juxta-position to several paddy fields presents itself, it is sure to be crowned with these picturesque dwelling places. Close in the neighbourhood of the houses, often surrounding them, lies the cultivation which supports the inhabitants, stretching forth in immense unbroken fields, as level, and at times as green, as a billiard table. .Nothing would so much delight the eye of the English or Dutch farmer as the appearance of these lands, and the extent of them, many of the fields of uninterrupted cultivation being several miles in area; he would be rather astonished though at the method required to be pursued in the agriculture.

Cachar is essentially an agricultural district, and supports but few manufacturers or artificers: nor does trade flourish. Beyond one or two villages of potters, who are also agriculturists, and one or two blacksmiths, who reside at the marts on the frontiers, and sell their wares to the hill tribes, there are no others who live by craft. Each family is its own weaver, and has no need of either carpenter or mason. Every man is expert at splitting bamboos and tying cane, and this simple art supplies the place both of the builder and the joiner. Mat and basket work is commonly practised, and there is no exclusive manufacture of any other kind. Boats are rarely if ever built in the province, except those of the very rudest kind, all the timber being floated down to Sylhet for the purpose. Except at the Sudder Station, Silchar, there is no congregation of houses that it is possible to call a town or even a village. There are no fixed bazars daily open, but fairs or "hauts," are periodically held at certain spots in the different pergunnahs, and are attended by the inhabitants for many miles round. All surplus produce or manufactures are here brought and disposed of. Here also resort the inhabitants of the hills laden with cotton, bees-wax, cane or fire-wood, which they barter for iron, salt, or manufactured weapons. At Silchar one or two lines of houses form a street, and a few shops are always kept open, but here two fairs are regularly held twice a week, and are numerously attended, and, except at those times, it is difficult to get the commonest necessaries for living.

Beyond the articles necessary for the consumption of the European inhabitants, and perhaps a few pieces of cloths, together with a few maunds of cocoanuts and betel-nuts, there are no imports from the West. From the East come ponies, buffaloes, and cows, and the frontier tribes bring in ivory, bees-wax and cotton. The exports are considerable, paddy and rice find their way down the river in large quantities, as also mustard seed, and linseed, timber, bamboos, thatching grass and cane, are floated down the stream in large rafts, often a hundred yards long by twenty broad. Cotton grown by the hill tribes, and sold to mahajuns, or bartered for live fowls, iron and salt, is taken down to Sylhet and Dacca. Ivory and bees-wax is also exported in small quantities, and many of the ponies and cattle which find their way in from the East, pass through into Sylhet and lower Bengal. Cocoa and betel-nuts in considerable quantities are taken over the hills to Munipoor, as are also cloths and a few articles of European manufacture.

The great drawback to trade is the want of roads. The river indeed is a great highway for the conveyance of merchandise, but its tortuosity, although in many respects it is favorable, prevents swift communication with the Lower Provinces, and between places in the district itself; and the profits of exchange are swallowed in the expenses, and in the time occupied by the transit of goods. The little trade that there is, is wholly on the river, its tributaries, and the neighbouring jheels. Sylhet, though not further than sixty miles as the crow flies, is five days' journey by water, and in coming up the river, the current renders the voyage considerably longer; communication between all places within the district is commensurately retarded. Every householder is obliged to keep his boat, which he launches on market days during the rainy reason, to convey himself and goods to the appointed place. For seven months in the year he has no other means of communicating with the places around him. It is not that the whole surface of the country is entirely under water, .this is never the case. But the nature of the soil is such that with the degree of moisture to which it is subjected, it becomes so softened that all passage over it becomes oppressive and difficult, each step sinking the leg, half way up to the knee, in quaggy mud. It is impossible even to keep kutcha roads in any thing like an effective condition during the rainy months, the action of the water upon the spongy and porous earth of which they are constructed, cuts them up into deep ruts, and makes them as heavy to travel over as the neighbouring paddy fields. The remains of a road between Sylhet and Silchar still exist, but want of repair has rendered it impassable, and it is rarely if ever used, even in the cold weather. A portion of it from Phoolbaree to the Sudder station has been repaired since we took possession of the province, and is partially bridged. Even this small portion, not exceeding 12 miles in length, is of great benefit to the inhabitants, and is generally thronged with passengers, but being a kutcha road, it is in a state impassable, with comfort, to any other animal but elephants, for six months each year. A good military road, passable at all seasons of the year, was constructed over the hills to the valley of Munipoor some fifteen years ago. Its length is a hundred miles, and trade has been much accelerated in consequence of it in that direction. But the terminus of that road at the foot of the hills, has not yet been connected by a road over the plains to Silchar, half the advantages have thus been thrown away, and it will be found that the chief traffic between this and Munipoor, is monopolised by the inhabitants of the Eastern Pergunnahs, who lie close to the terminus of the hill road. Thoroughly to develope the resources of Cachar, it will be necessary to run a line of road, passable at all seasons, from the extreme West, passing through Silchar to Banskandy, where it would join the Munipoor road. Another road should be made to Burkhola, and connected with a road crossing over through North Cachar to Nowgong in Assam.

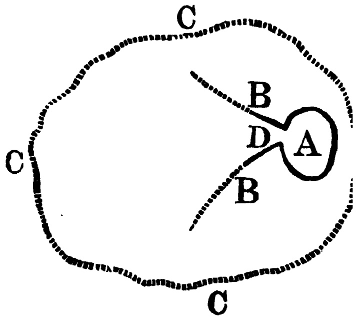
A third road should run South from Kateeghurra into Hylakandy, with a view to being prolonged, and eventually pushed on to Chittagong, when the state of the tribes in that quarter has been ameliorated. Secondary roads should also connect Goomurah, Kalien, Bikrampoor, Burkhola, and Oodharbund on the North, with each other, and with Silchar or with the main road running East and West, as also Bundrāj on the South. The soil where the road runs over alluvial lands should never be used save for the embankment, in making them. The red clay of the hills laid over this to the depth of a foot would form an excellent way. Where the road does not run in the immediate neighbourhood of *teelahs*, where the red clay is procurable, it might be metalled with the conglomerate rock which abounds in the river, or with gravel from the smaller hill streams, and these could be conveyed to the spot with little difficulty or expence during the rainy season. The road to Nowgong through North Cachar is already in projection, and is I believe to be made as permanent as possible. Indeed, unless the roads are made of a superior kind to most country roads, they will be useless for seven months out of the year. The advantages of an easy communication between the most important places in the district would be very great. The introduction of wheeled conveyances alone, which would surely follow the establishment of roads, would secure incalculable benefits. At present no such thing as a cart or hackery is known to the inhabitants of Cachar, buggies and carriages are out of the question, nor is riding on horseback practicable for half the year. Those only therefore of the European inhabitants who can afford to keep elephants, can go abroad to enjoy the refreshing air of the morning or evening. So bad are the roads that cattle even are never used as beasts of burden. The only land carriage is effected by means of coolies. These carry a burden of about a maund, disposed in two bundles, bangy fashion, or a lesser weight on their heads. The Nagas or Kookies, who for hill travelling of course, far surpass the natives of the plains, carry a burden of from 40 to 60 lbs. in a cylindrical basket on their backs, attached by a strap passing over their foreheads or chests. Elephants are common in Cachar, being caught wild in the jungles, both to the North and South of the plain lands. They are not much used for the carriage of goods, having sufficient occupation in the much more lucrative occupation of dragging timber. The hire of an elephant when so employed is two rupees per diem, but so severe is the work that it is not possible to keep him at it for more then fifty or sixty days in the year, without injuring him or causing his death. The elephant owner, when dragging timber, is often paid in kind, being entitled to a portion varying from one half, to one third of the whole timber drawn by his elephant to the nearest water channel, whence it is floated down in the flood; the rate depending upon the distance it has to be dragged. The cost of keeping elephants is very trifling. Those employed for the above purpose are actually no expense whatever to their keepers. When not employed the legs of the animals are tethered, and it is let loose in the jungles to procure its own food. When in work a cooly upon two or three rupees a month is placed upon its neck, and it is never allowed any grain. Elephants kept for riding or hunting purposes require a little more attention. A mahout on five or six rupees a month is retained, and three or four seers of rice a day allowed. The animal fetches its own fodder from the jungles daily, and it is necessary for the perfect health of the elephant to vary its food according to the seasons of the year, some grasses being considered too heating for consumption during summer. In the rainy season the *dhul* grass, growing in the jheels, is considered the best nutriment; in the cold weather *khak, eekur, and tera,* the grasses composing the chief jungle in Cachar; and during the hot weather of April and May, plantain trees are the best description of food. There are two separate and perfectly distinguishable races, or, vernacularly, *jats* of elephants, caught in the jungles of Cachar. The first in value, being the most efficient for all purposes, is called *koomeerah;* and is marked by the smallness of its head, the stoutness of its body, and swiftness of its pace, the foot being lifted no higher than is absolutely necessary to clear intervening obstacles. The other is called *meergia,* has a large head, and long legs in comparison to the size of its body, its paces also are high and more clumsy. A cross between the two above is called *nussul* and is easily distinguished from partaking of the qualities of both. Either *jat* is equally adapted with the other for work requiring strength, and there is no difference in intelligence or sagacity; but the *koomeerah,* for all purposes, and especially for riding, is preferred to both the others, and the *nussul* ranks above the *meergia.* The *mookna* is a name attached to male elephants of either caste who have no tusks. These are, generally speaking, large and strong animals, having by reason of their dental deficiency been longer able in youth to draw nourishment from the mother. Elephants with one tusk only are called *gonesh* and are objects of some reverence among Hindoos.

The price of an elephant depends upon its height, caste, and age; they cannot be fully valued, either, until they have passed three years in captivity, for during this initiatory term they are subject to diseases which often carry them off. The elephants of Cachar are rarely found higher than nine feet, and the average height lies between seven and eight feet. The age is a very difficult point to determine, that of a young male whose tusks are still growing may be arrived at by marks on the ivory showing each year's growth, but when full grown their years cannot be numbered save by guess. Full grown young elephants are however distinguished by curved backs, while very old ones have their backs straight, instead of humped. Prices varying from Rupees 300 to Rupees 800 and 1000, are given for full grown elephants.

Government reserves to itself the right of elephant catching, and for several years private parties have been prohibited from entering the jungles for that purpose. About an hundred elephants are annually caught in Cachar, and drafted into the public service.

The value of these animals—some where about half a lakh of Rupees,—when taken into consideration, is an important addition to the revenue of the country. The process of securing these monsters of the forest is interesting, and well worthy of description. The cold season is chosen for the operations, which are called *kheddah.*

A band of four or five hundred men, distributed into parties, each with a leader, is required for the purpose. Five or six experienced hunters, precede this body, by a day's journey, and make their way into the jungles in search of foot-marks. When they come upon these evidences of the near existence of a herd, a message is sent to the main body, who silently approach, and surround the herd, enclosing it within a line of sentries, in a circle some 10 or 12 miles in circumference. It is necessary that the ground on which the animals are surrounded be as regular as possible, for which purpose should the place where the elephants are first met with, be hilly or uneven, they are made to shift their position by slight alarms, and the blowing of a reed instrument like a fife, and are thus moved on until a proper place is reached for surrounding them. The circumjacent jungle is then cleared for a few yards all round this huge circle, and a slight fence of boughs and bamboos erected along the entire circumference. This fence is by no means strong enough to resist a charge of the elephants, but is intended merely to present an obstacle to their eyes, should they venture near it, and contemplate departure. Fires are then lighted round the enclosure, at which the sentries sit and watch night and day. Should the animals endeavour to make a rush past, the men close in towards the point of their charge, and drive them back with discharges of blank ammunition. Enclosed thus on all sides, they retreat towards the centre of the circle, which is far enough removed from the sides to let them remain undisturbed. A strong stockade (A) is then built, of about five acres in area. Within the large circle, but upon its circumference, huge timbers, fifteen to twenty feet above the ground, are planted close to each other to form it, and care is taken that it shall enclose a number of large trees, to which the captured elephants may be subsequently tethered.



Within the palisades a ditch is dug all round, save at the doorway (D), which faces towards the centre of the large enclosure, and is about twelve feet broad. The counterscarp of the ditch, which is six feet in depth, is made perpendicular, and the scarp slopes inward, the earth being thrown into the interior. Care is taken to cover the ditch, and the newly turned earth with boughs and leaves, for there is nothing that the wild elephant distrusts so much as fresh soil. Two lines of strong palisades (B B), are then built one from either door post, stretching out into the enclosure (C C C), widening as they extend; they are carried on for several hundred yards, and their extremities are lengthened by lighter fences. A strong portcullis having been erected at the door-way, the trap is prepared, and the sentries round the large enclosure close in towards the gate, with shouts and yells and discharges of fire-arms. The elephants are driven within the two lines of palisades, and proceed along them as they narrow, until they enter the stockade, when the portcullis falls, and the whole herd, sometimes to the number of two hundred, is secured. The frantic commotion into which these huge monsters throw themselves when they become conscious of their position, is described as something really terrible. They shriek and trumpet, and roar, stamp upon the ground, and throw themselves down on it with the greatest violence. There is a visible vibration of the ground for a hundred yards round the stockade, from the collective weight of their tread in their transports of fury. Several become victims to their own passion, and die of rage or of injuries inflicted on themselves or one another in their paroxysms. In the course of a day or two, their fury becomes to a certain degree spent, and they regain a little tranquillity. Trained elephants called *koonkies* are now employed, for the purpose of tying the wild ones to the trees within the stockade. Three or four of these are admitted within the palisades, each with a rider on its neck armed with a long spear. They approach the animal first selected and surround him, wedging him in tightly between their bodies, so that he can neither stir foot nor trunk. One of the mahouts then slips off his seat, and makes fast the hind legs to an adjacent tree, and in this manner, one after the other, the whole herd is tied up. The stockade is then broken down, and the newly caught elephants walked of by degrees, each between two *koonkies*, who prevent their being obstreperous, by beating them with their trunks. In the course of a month the wild animal is almost completely tamed, and admits a rider on his neck. This wonderful change in his disposition brought about in such a short time, is effected not by severity or violence, but by kindness and attention. Food is regularly supplied to the bound monster, dainty bits being offered him at arm's length and at the full stretch of his tether. His back and skin, always under the circumstances in a state of irritation, are scratched with long pointed bamboos, till he not only becomes accustomed to the presence of man, but regards him with affection. He is then mounted, and trained. The trained elephants or *koonkies* require very little more teaching than that given to any other. Large and strong animals are chosen, and of course those most amenable to order are the best. All that is necessary is to allow them to be spectators of the operations for one season only, one new *koonkie* being sent with the three or four old ones to secure the wild elephant, after which they can be made to perform the work themselves. The *kheddah* operations, independently of the salary of the establishment maintained by Government for the purpose, cost the State about Rs. 5000 a year. Private individuals could manage them upon the same scale for about Rs. 3000, without any establishment beyond two or three elephants and their mahouts.

Besides this wholesale method of capturing elephants there is a way of noosing them, which was much practised in Cachar before the Government prohibition came out. A trained elephant with two men on its back, armed with spears, and provided with a stout rope one end of which is attached to their own elephant, and the other formed into a noose, boldly enter into the midst of a herd, and throw the noose over the head of any elephant who may approach near enough to them. But the chances are much against catching him, and the experiment has to be repeated ten or twelve times, before one is secured. Wild elephants are also caught by the administration of drugs.

A female decoy is let loose in the jungle and attaches to herself a male, who deserts the herd in pursuit of her. Their position in the forest is marked, and the neighbourhood is baited with dainty bits of sugar-cane and plantain pith into which an intoxicating drug has been introduced. The animal eating it becomes quite drunk and unconscious, and finds himself, on recovery, made fast to a tree.

The Kookies slay elephants for the sake of the ivory and the flesh, which they eat. They effect their purpose with poisoned spears, from tops of trees. The madness to which elephants in their domesticated state are subject, and which has so often been the cause of loss of human life, is confined to the male, and arises from his restriction from natural indulgences during periods when nature very forcibly dictates sexual connection. The only plan to be pursued when these paroxysms occur, is to tie the animal up with strong ropes until the furor wears off. Elephants when in close captivity, deny themselves all sexual intercourse, but when left a little to themselves, and allowed, though tamed, to wander about the jungles and obtain their own food, they have been frequently known to breed. I have at present in my possession two young elephants, both of whom were born long after their parents had become domesticated.

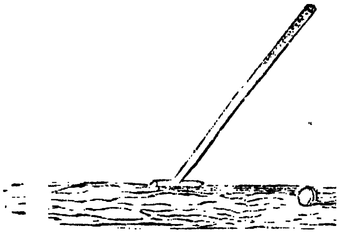
A full sized horse is an animal unknown in Cachar, either for the purpose of carriage or pleasure. But two very good breeds of ponies are brought in from the East, one from Burmah, and the other from the valley of Munipoor, and find their way in considerable numbers into Bengal. They are both excellently adapted for the requirements of hill travelling and locomotion in a country where there are no roads. They are not used as beasts of burden, but solely for equestrian purposes. Of the two breeds, that from Burmah is undoubtedly the best, the animals are of a larger size, and have more bone and bottom than the Munipoorie ponies, but they have not the same blood appearance, or perfectness of shape. A Munipoorie pony seldom stands more than 12 hands in height, is slightly built, but in perfect proportion, and often looks like a miniature Arab, the falling off, when there is any, being generally in the hind-quarters. In Munipoor they can be bought at all prices, from Rupees 5 to Rupees 100. A duty of Rupees 8 is levied on them by the Rajah, when exported, their average price in Cachar may therefore be estimated at about Rupees 40. An attempt was made many years ago by Government, at the instance of Captain Gordon, the Political Agent in Munipoor, to cross the Munipoorie breed with a larger stock, and for this purpose about a dozen stud-bred mares were sent into the valley, but the experiment completely failed. Both the mares and their progeny being unable to stand the climate.

Indeed the Munipoories, as a nation, though great equestrians and passionately fond of riding, have no taste for large horses, and prefer the small animals on which they are mounted. They declare however that the breed of these has deteriorated much of late years, and is now no longer what it used to be when troops of Munipoorie horsemen swept the plains of Burmah in a tide of conquest, and planted their spears at the gates of Ava itself; and it must be acknowledged that it is difficult to imagine a handful of men mounted upon such *rats*, overrunning such extensive tracts of country. Their tale is nevertheless true.

Ponies from Burmah pay a double duty, being assessed by the Burmese as well as the Munipoorie authorities. Their value is also greater, rising sometimes to two or three hundred Rupees. A fair average price in Cachar is about Rs. 60.

The cost of keeping ponies is very trifling, one man upon Rs. 2-8 or Rs. 3 a month being adequate for the purposes of grooming and cutting grass. When any number are kept, a much smaller number of men to that of horses would be sufficient, and trains of them with packs might be organized for the conveyance of goods across the mountains, at very small expense. The animals thrive very well upon green grass alone, and natives seldom give them grain. The soil of the country being universally soft, they are never shod, but have their hoofs pared periodically.

Ponies in Cachar are possessed generally by the European community, and by Munipoories. These latter ride on immensely heavy saddles, with high peaks both before and behind, and shield-like flaps of leather pendant on either side, outside which hang the stirrups. The game of hockey or shinty is played by them on horseback. This is such a noble, manly and exciting game that it is astonishing to find it in practise among an oriental race, so close to the tropics. One would rather have expected to meet with it among the nations of the North and West. The game is worthy of adoption by the youth of Europe. I am not aware that it has ever before been described. I will therefore, however, out of place, devote a page to its tactics. A flat turfy piece of ground 400 yards in length by 200 in breadth is required. The ponies ought to be small, swift for their size, and have as obedient mouths as possible. The club consists of a rattan as thick as an ordinarily sized walking stick, and five feet in length, at the lower extremity of which is attached, at an angle of about 45°, a cylindrical piece of hard oak wood, one foot in length, and an inch, or an inch and a quarter in diameter, as in the figure. The whole weighs about 1 lb. 10oz. The ball is a globe cut out of the light bulbous root of the bamboo, and is from three to four inches in diameter. The suppleness of the cane, the weight of the club, and the elasticity of the ball is such that a well delivered stroke will lift the latter about an hundred yards.



Two sides are formed, from five to seven a side being the best number. The ball is thrown up in the centre of the ground, and each party endeavors to drive it to opposite extremities. It is really beautiful to see the game played by men expert in the exercise, and by ponies well trained, for the animals in the course of time acquire a perfect knowledge of the play, and enter into the excitement of it as well as the riders.

The club is held in the right hand, the reins in the left. All the skill of horsemanship, and dexterity in the use of the club, are called into full play, nor is the latter by any means a small matter: the ball has to be driven in one given direction, whatever may be the point of the compass towards which your horse's head may be turned, and at whatever rate you may be going. Their are eight distinct strokes in the game, the first six corresponding in a measure to the first six cuts in cavalry broad sword exercise. The 1st and 4th drive the ball backwards or forwards, respectively, when it lies to the left of your horse. The 2nd and 3rd do the same when it lies to the right of your horse. The 5th and 6th drive it to left or right when it lies directly in front of the horse, and the 7th and 8th having no corresponding cuts in broad sword exercise, drive the ball to right or left when it lies to the rear of the horse. But as in combat, many cuts are delivered at other than the inclinations taught in the rudiments of fencing, so in the game of "*Kāng jai,*" or Hockey upon horseback, the judgment is called upon to decide on the proper angle at which a stroke shall be delivered, in order to elude an adversary or play into the hands of an ally. Nor is driving the ball, alone, the whole of the game, considerable skill is required in baulking your antagonist, in interposing your horse when he is about to strike, in hooking on your club to his, in guarding the ball from his stroke with your club as in fencing you would your own person from his sword.

No sport calls into play such lively emulation both in man and horse, or is no intensely exciting. At one moment there is all the interest of a horse-race, then the violence of a hand to hand encounter, when men and horses are crowded and entangled together, struggling desperately for the ball. The satisfaction of the cricketer in delivering "another four," is felt when, with clear ground, you have the ball to yourself—that of the huntsman, when, carrying it along, pursued by the whole field, you have confidence in your horse, and know he will take you to the exact spot with reference to the rolling ball, whence a stroke can best be given. The stroke missed, there is a pleasure in witnessing the consciousness of the misfortune evinced by your charger, and his eagerness to retrieve it, the sudden stop, the wheel round, without hint from heel or rein, so as to reach the ball before the pursuers are up,—the spring forward again when it has once more been hit, and the relaxation into quietude when the goal is won. This with a well trained pony: with one unused to the game, the fight for mastery is as much with the animal as with your opponents, and either triumph has its pleasurable sensations. I have introduced several gentlemen to this game, and they have with one voice proclaimed its excellence. At home the little Shetland pony would be the very animal required for it, and in this country likely ponies can be had everywhere. I feel sure that if the game were a little more generally known, it would find favor at every station throughout India.

The animals of all others made most useful by the natives of Cachar, are buffaloes and cows. These are made to perform the most laborious parts of the operations of agriculture, and the former are also made use of by the Munipoories for drawing sledges, in which the harvest is conveyed home, and even some times for riding over marshy ground.

Buffaloes are brought over in great numbers from Burmah and Munipoor. A heavy tax of from Rs. 10 to Rs. 14 is levied on them by the Rajah, when exported from the valley, but the Burmese buffaloes escape with a somewhat lighter custom. Good Munipoorie buffaloes are valued at from Rs. 30 to Rs. 40 each in Cachar, and Burmese buffaloes may be had from Rs. 10 upwards, the latter being much the inferior animal. The imported buffaloes, especially the Munipoorie ones, are very fine animals, and I think larger than any domesticated kind. I have ever met with elsewhere. The breed however deteriorates in Cachar, although the place would seem to be the very land for such animals, the jungles and jheels being full of wild ones. Accidents, and even loss of life, from coming across these savages in their retreats, are very frequent among the more remote inhabitants. The presence of the wild buffalo is not however taken advantage of as it is in Assam; there, although the tendency to degenerate is the same, the stock is maintained in full vigor, by placing the females out in the jungles, at certain seasons, to be covered by wild bulls. Buffaloes are valued chiefly on account of their size and strength, considerable quantities of milk is obtained from them, each animal giving from one to four seers a day, which sells for three pice a seer. The milk is thick, and much richer than that of cows, and butter made from it has a white and oily look, and is not much patronised by Europeans. During the ploughing season, buffaloes are let out by some people for the purposes of cultivation, and their hire comes to about one rupee, or one-four, paid in paddy. No difficulty or expense is attended with the keeping of buffaloes, the neighbouring jheels affording excellent pasturage. Of late however, owing to the extension of cultivation in every quarter, some attention is required to prevent trespass. Bullocks and cows are second to buffaloes in usefulness, but much inferior to them for the required work. Two cows are unable to do the same amount of labor as one buffalo, although they are generally rated equal to one. The buffalo plough is attached to a pair of shafts, between which a single buffalo is harnessed, the instrument being dragged after the animal, and guided by a single man in the rear. The bullock plough is attached to a pole, on either side of which an animal is harnessed, and it is dragged and guided in the same way. The cows are of a small weak breed, and are, generally speaking, in miserable condition from want of pasturage. It is common to see them sink under the fatigue of ploughing. Both bulls and cows, as well as bullocks, are used in the field, the last is however less commonly met with. The prices of cows vary according to their strength, size, and lactific capabilities, and run from one rupee to ten rupees a head. Cows of a somewhat larger, though very similar breed, are sometimes brought from Munipoor, and pay an exportation tax of Rs. 4 a pair. Two and a half seers of milk a day is the maximum quantity extracted from the best cows in the country, and to produce this, they require to be looked after and fed regularly. The average quantity given by each cow in milk cannot be more than half a seer. No preparations of milk, save *ghee* and *dhui*, are made by the inhabitants of the country, and cow's milk is valued at the same rate as that of buffaloes. Besides these there are few animals domesticated by the natives. The hill tribes rear the *Methin* or wild cow, but solely for the purpose of slaughter. This is a large unwieldy animal, growing to a bulk beyond that of the buffalo, and its flesh is much prized. The Kookies also have a fine animal of the goat species, with hair sometimes upwards of a foot in length, but neither the *Methin* nor the Kookie goat thrive in the plains. The small Bengalee goat is extensively bred however, and produces from one to three young at a birth. These yield from one to eight chuttacks of milk each, and are valued from eight annas to three rupees a piece. Sheep are not reared in the country, and there are none in it save the few possessed by the European community. Poultry, though abundant, is not to be had in any quantity in the markets, being either used for home consumption or bought up by mahajuns for the purpose of trade with the frontier tribes. All animals in Cachar, especially the cattle, are subject to fierce epidemics, or murrains, which carry off immense numbers of them, and cause great distress among the rural population. These diseases appear to correspond with cholera and small-pox in human beings, both as regards their symptoms, and the fatal effects. In the one copious purging is succeeded by utter prostration of strength and speedy death, and in the other pocks break out all over the body and head, and are attended with the same result. It must be remarked however that the presence of these diseases among the animals does not infect the people, or *vice versa,* at least I am led to infer this from the fact of the mortality occurring at different seasons, and the population remaining quite healthy, while the whole country is redolent with stench arising from the decomposed bodies of cattle who have died of the epidemic.

I now come to notice the vegetable productions of the country, both those arising from cultivation, and that yielded spontaneously by nature, together with the method pursued in the agriculture, and the profits arising therefrom. These I am afraid will be found to be so similar to that of the rest of Bengal, which has doubtless been often described, that I despair of being able to make the subject either useful or entertaining.

Paddy, called *dhān* in these parts, is of course the staple produce, being almost the sole food of the entire population throughout the year, and being also considerably exported. Of this grain there are no less than four kinds of crops, obtained at different seasons of the year, and on different sorts of land, with different methods of culture, independently of the cultivation practised by the hill tribes. The first crop put in by the inhabitants of the plains is called *doomai-murālee,* and is commenced on during the showers and storms of April. The land having become to a considerable extent saturated by these, is ploughed over some five or seven times, and the seed is broad cast over it. The best description of land is not chosen for this crop, as it is a very inferior one; but as it does not require much irrigation or moisture, any high or irregular ground not suited for the other crops, is put under cultivation. The crop will stand any amount of rain, but a very wet sub-soil ruins it; inundations, also, lasting beyond a day or two, are fatal. It is cut towards the end of July, and generally in an unripe state, as the constant rains prevailing during that month prevent its reaching perfect maturity. This crop is not raised for exportation or sale, but more for the consumption of the farmer himself, and it is in every way an inferior production, both as to quality and quantity yielded.

One maund of seed is required for three *keears* of land—a *keear* is the twelfth part of a *koolba*, or *hul*, which is supposed to be the area which one man and one plough can bring under cultivation. It is equivalent in English measure to 4 acres, 3 roods, 10 poles, 21 yards, and 77 square inches. The divisions of land in Cachar, are carried out to very minute spaces, and are as follows :—

3 Krants	1 Cowrie,
4 Cowries	1 Gunda,
20 Gundas	1 Pun,
4 Puns	1 Rake,
4 Rakes	1 Jestie or Jeyt,
28 Jeyts	1 Keear,
12 Keears	1 Hull or Koolba.

The one maund of seed sown in three *keears* of *doomai-murālee* lands, yields on an average fifteen maunds of produce.

Another crop called *aoos* is commenced upon at the same time as *doomai-murālee.* Small seed beds are prepared for this paddy, generally on high pieces of ground in the neighbourhood of the barees or enclosures, sometimes within them. The beds are well moistened, and are about six or eight feet in breadth, with a water channel running between each. The seed is thrown on the surface, and owing to the softness of the mud is half emersed in it by its own gravity, no harrowing being undertaken. Preparatory to being sown, the seed has to be steeped in water for a day and a night, and then allowed to dry. This process stimulates germination, and causes the husks to burst a little, in which state they are thrown on the ground, and spring up in the course of a few hours. Between twenty and twenty-five days after sowing, during which time other lands resembling much those put into requisition for *doomai-murālee,* have been put into preparation, the seedlings or "*charas*" are plucked up by the roots for the purpose of being transplanted. This is done in such a rough way, that those unaccustomed to witness the cultivation would prophesy immediate death to the plants. The tender blades are grasped by the hand, and plucked from the ground until the hand is quite full; the roots are then knocked sharply over the shin of the individual plucking, to free them from any soil sticking to the fibres, after which the tops of the blades are nipped off by the hand, and the *charas* tied up in bundles, and allowed to remain above ground for several days, until a fitting time is arrived at for the transplantation. The ground prepared for this purpose has been well irrigated and moistened to the consistency of thin porridge, by means of being partitioned off into small squares, defined by low mud walls some eight inches high, within which all rain water is retained, and, in default of rain, into which water from any adjacent ditch or jheel is thrown by means of ladles made of matwork. The water is intimately mixed with the soil, not only by means of the plough, but by trampling with the feet, and, for the purpose of leveling the field, buffaloes or bullocks are harnessed to a small piece of timber, which is dragged over the surface. The ground thus prepared, the cultivators take bundles of the *charas,* holding them in their left hands, and with their right separating each seedling, and, taking hold of it by the root, plunge it with the hand into the soft mud, leaving it there at a slight inclination with the ground, and about six inches removed from each other. This operation, though it would appear tedious, is performed with astonishing rapidity, the effect of course of constant practice.

The newly-transplanted *charas* look for several days in a very sickly state, and are of a faded yellow colour, but they soon recover their green appearance and erect posture. The *aoos* crop is cut in all August, and like the *doomai-murālee,* and, for the same reason, is reaped in an immature state. It is also used for home consumption, more than for sale or exportation. *Aoos* thrives without a very great quantity of rain, but requires more than *doomai-murālee,* and it is subject to no injury from a very great quantity even. It can bear inundation for five or six days only, and requires rather a moist subsoil.

One maund of seed is required for seed-beds half a *keear* in area, and the seedlings from those beds will cover a field of four *keears,* which will yield on an average twenty maunds of *dhān.*

Another crop of *dhān* which is put in even before *doomai-murālee* and *aoos,* is called *bawa.* It is not much grown in Cachar, but many square miles of it are cultivated in the neighbouring province of Sylhet. It is grown in jheels, the seed being sown in the months of March and April, when the waters are dried up; it germinates with the first showers of rain, and however high the waters may rise on the ground on which it is sown, it still keeps its head above them. The stalks are therefore in many places twelve and thirteen feet high, the whole, save the ears and a few blades, being under water. The crop is cut in October and November, and the harvest is often reaped and brought in on boats, as the fields are in no other way accessible. In the height of the rains I have gone a day's sail over fields of *bawa dhān,* but I am unable to state the profits arising from this cultivation. The crop is a failure when, after any considerable rise of the waters, there is again a fall, in which case the heads droop down into the water and rot. *Bawa* is cultivated in very small quantities in Cachar, and I believe only in the pergunnah of Hylakandy.

By far the most profitable and extensive crop of paddy raised in Cachar, is called the *sàil* or *hàil* crop, the Bengalees of the country making very little distinction between the pronunciation of the letter H, and that of S. This is the latest crop of paddy, and is not put into the ground, even into the seed beds, until the middle of May, and the sowing is continued until the middle of June. The culture is precisely similar to that of the *aoos* crop—the seedlings being taken up and transplanted in the same way. The lands chosen for *sàil* cultivation are however the best that can be had, that is the most level and regular, lying low, yet not subject to long continued inundation. The crop requires as much moisture as it can possibly receive until the months of November and December, when if there are heavy rains, it is spoiled. Long continued inundation will kill it, but it is not materially affected by immersion for ten days during the height of the rains, and this is about the utmost it can bear. It ripens, and is reaped from about the middle of November to the middle of January, and it is a very glorious and rich sight to see the vast extent of ground waving with this fine cultivation. The height of the stalk rarely exceeds four feet, and before reaping is almost bent to the earth with the weight of the ear. The increase is very great, and varies considerably, but not in the worst years can it be called unprofitable. One maund of seed is required for seedling beds of half a *keear* in area, which when transplanted will cover four *keears*, and yield a return on an average of fifty maunds. In the worst seasons, the four *keears* rarely if ever yield less than twenty maunds, and they have been known to give eighty or twenty maunds a *keear*. The best kinds of rice are yielded in this crop, and it is to this that the cultivator trusts for money wherewith to pay his revenue, lay in stock, and buy necessaries.

The *doomai-murālee* crop yields four or five kinds of rice, each bearing different names, but all of inferior quality.

The *aoos* crop gives three likewise of inferior quality, these being rarely if ever in the market, it is difficult to arrive at their value; and the same may be said of *bawa*. But the *sàil* can number upwards of twenty-five qualities, each with a distinctive name, and with properties widely different. The best kinds of rice yielded in the *sāil* crop are called *hurree narain* and *kālee jeerun*, and the coarsest kind is denominated *jhurria*. An idea may be formed of the estimation in which these varieties are held, when it is known that at times when *hurree narain dhān* is selling at four maunds for the rupee, *jhurria* can be had at from six to eight maunds. The prices at which *dhān* is sold in Cachar vary of course according to the nature of the season, and the abundance thereof. The dearest rates are however never less than three maunds per rupee on an average of all kinds, and when the crops are very abundant eight, ten, and sometimes twelve maunds, may be had. It must be understood however, that the maund of Cachar is a very different measure from that in vogue in other parts of India. Selling by weight is seldom had recourse to in that country. The only measure known and used by the inhabitants in general being called *katee.* The *katee* is a small round basket eight inches in diameter, and three in depth, with an interior semi-circumference of eleven inches. Twenty of these, heaped measure, is called a maund. In actual weight, twenty *katees* of *dhān* equal only twenty-seven and a half seers, of eighty tolahs each, whereas twenty *katees* of rice *(chawul)* equal forty-two and a half seers standard weight. But such is the dexterity of the native in measuring with reference to his own interest, so uncertain is it to be exact in heap measure, that twenty *katees* of rice may be considered only equal to forty seers, or one standard maund. *Dhān* beaten out of the husk into *chawul* or rice, is reduced to about one half its bulk, that is two *katees* of *dhān* will yield one *katee* of rice, but in weight a maund of *dhān* will yield twenty-four seers of rice. Thrashing or beating out the *dhān*, when it is required for home consumption, is almost a daily duty of the women of the house. It is managed in a large wooden mortar, with a stout heavy sapling as a pestle, and must be a most laborious occupation. When beaten out in larger quantities for the market, the men perform the business by means of a wooden hammer, the shaft of which is placed on a fulcrum, and the head moved up and down by the application of the weight of the foot at the other end, as is commonly practised in making *soorkee* out of burned bricks. The cost of beating out *dhān* is considerable, being no less than one fifth or twenty per cent., four *katees* of *dhān* being allowed for every twenty beaten out.

No use is made of the husk of the *dhān*, except that of burning. Placed in an earthen pot, and lighted, it burns slowly, and retains the fire during the whole night. The paddy straw is also used for no other purpose save fuel, and during the cold weather, the whole population trust to it for heat.

Second to *dhān* cultivation in Cachar in extent, is that of mustard seed (*sursoo.*)

There are two methods of raising this seed. The one being carried out in regular fields, and called *chara khētee*, and the other in uncleared jungles, called *kheel khētee*. The lands used for the first are the same as that on which the *doomai-murālee* and *aoos* crops of rice have been raised. The cultivation commences in November and December. The land is ploughed over some seven or eight times, and manured with cow-dung and ashes. The crop flowers a month after being sown, and the effect produced by large expanses of this cultivation glittering in golden yellow, is very rich. It ripens and is reaped in January and February; eight seers of seed are required for one *keear* of land, and the yield is from three to seven maunds per *keear*.

The *kheel khētee* is carried on at the same time as the *cucra*. Tall grass or reed jungles being cut down in

November, allowed to dry, and burned. The seed is thrown in among the ashes, no other kind of attention being required. Six seers of seed are devoted to one *keear*, and the yield is considerably greater than that of *chara khĕtee.* The crop is however uncertain, and depends upon a fall of rain after the plants have risen a few inches; should this be wanting, the hot manure of the ashes burns up the plant, and there is no produce whatever. The mustard seed from both methods of cultivation are considered equal in quality, and sell at from one maund to two and a half maunds per rupee. But little oil is extracted from the seed in the district, most of that raised finding its way into Sylhet. The oil sells at from two and a half to five seers per rupee. Hylakandy and Sonapoor are the chief mustard raising pergunnahs.

Sesamun *(teel)*, and linseed *(teesee)* are also cultivated, in no very large quantities however, in the cold weather. The land for these crops requires seven or eight ploughings, but no irrigation or manure. The produce all goes to the Sylhet market, as the natives themselves have no use for the seed. *Moong* and *kullai*, inferior kinds of vetch, or *dâl*, are grown in some quantity. The seed is put in in October and November, in lands previously under *aoos* or *doomai murālee* cultivation, or on any high or *teelah* lands. It is reaped in January and February. The lands for this crop require four or five times ploughing, but no manure or irrigation. Ten seers of seed are cast over one *keear* of land, which produces from one and a half to two maunds. It sells at from one to two maunds per rupee. Both kinds are used by the inhabitants as *kitcheree* to their rice, and throughout the Eastern frontier *kullai* takes the place of grain in other parts of India, and is the grain given to horses and sheep.

Sugar cane, *ookh* or *kooyar*, is raised in small quantities, and is considered a very laborous though profitable cultivation. It is propagated by knots of the cane put in with the eye uppermost into ground softened for the purpose. The cultivation commences in February and March, and in a month the canes are ready for transplantation. The land prepared for its reception has much labor lavished upon it. It is ploughed over some ten or twelve times, well moistened and mixed with cowdung; it is then formed into lines of ridges of a foot or so in height, and three or four feet apart; the plant is put in between the ridges, and as it continues to grow, earth mixed with cowdung, is heaped upon the roots and stalk. This operation is performed about once a month. The cane is ready to cut in the course of nine or ten months. It is pressed by means of a rude yet ingenious machine, consisting of two solid wooden cylinders, which are caused to revolve in close juxta-position to one another, and between which the cane is inserted. The juice is received in earthen vessels placed below. The cane must be pressed twenty-four hours after cutting, and the juice boiled down as soon after extraction as possible, else some chemical process ensues which affects the quality of the *goor*. Nothing but *goor* is made from the sugar-cane in Cachar. There is another kind of cane planted in gardens, and intended only for eating, which reaches a size much beyond that of the common *kooyar*. It takes two years to reach perfection, and is very juicy, and refreshing. Oodarbund is the principal locality of *oohh* cultivation.

Sun and *pat* are cultivated in small patches in the neighbourhood of the *barees*. The ground is ploughed and prepared during the cold weather, the soil being well mixed with cowdung; no watering is necessary, and the crop is reaped in July and August. The stems are then soaked in water till the softer substances adhering to them rot away, they are then rudely carded by hand, and tied in bundles.

Capsicums, chillies or *mircha*, are sown in seedling beds in August. The ground prepared for the reception of the seedlings has to be well ploughed, and afterwards broken up with the hoe or *koodal*, and mixed with cowdung. The seedlings are transplanted when a month or a month and a half old, and require to be watered for a day or two in their new position. The fields are arranged in ridges, between which the plants are put in, in regular lines, and earth has periodically to be heaped up over their roots. The pod is formed in November, and the plant goes on bearing until the commencement of the rains. The chillies grown in Cachar are considered very good, but the crop is a most uncertain one, owing to the rains which prevail in September and October, so the prices vary very considerably, rising sometimes from two rupees per maund to two seers per rupee.

The above includes all that may be called agriculture in Cachar. In the neighbourhood of the houses are raised many vegetables and pot-herbs, which come under the denomination of garden cultivation. Among them may be mentioned *benguns*, *sim*, or beans, onions, *kudoos* or cucumbers, *huldee* or turmeric, radishes, yams, *lal sag* or spinage, and sweet potatoes. These are mostly all grown in the cold weather, and entirely for local consumption.

In the gardens of Europeans most of the vegetable seeds common in India are to be found, but they never reach that perfection to which they arrive in other parts of the country, and owing to the lateness of the rainy season, they are many months behind the rest of Bengal in producing. Neither the soil however, nor the climate are, in my opinion, to blame so much as the ignorance of the gardeners.

Of fruit trees bearing choice fruit there is no great variety in the country. The plantain and the pine-apple seem to be the only indigenous kinds worth much which flourish. Of plantains there are immense varieties, and they grow wild in the jungles ; *dingamānie, chumpa, and koolpet* are the most considered kinds.

Pine-apples grow in great luxuriance and without the slightest effort of cultivation. The plant appears *unable to die* in the climate, and will spring up however rudely, and at whatever season, it is cast on the ground, tasking considerably in keeping it thin. The jack tree is very abundant, and the timber of it is also in great request, the fruit never reach a weight of beyond ten seers.

The mango trees are stunted in growth, they bear fruit which ripen, but are mostly very acid. The fruit is attacked by a grub, which some suppose deposits its egg in the soft bud before the fruit itself has formed, and which completely destroys the pulp as it proceeds towards maturity.

Oranges, although they grow to such perfection in Sylhet, and on the lower slopes of the Cossiah hills, are not found of a good quality in Cachar. I question though whether a fair experiment has been made of the capabilities of the soil in the neighbourhood of the hills, and at the foot of their slopes, such being the locality of orange cultivation in Sylhet, and I am led to believe, from the fact of the best oranges to be had in Cachar coming from the pergunnah of Oodhar Bund, which is a hilly tract lying at the base of the mountains, that should the cultivation be properly carried on in well chosen situations, it might be much more successful. The betel-nut tree is seen in great numbers about the houses of the people, but does not reach great perfection, an insect which eats its way up the stem being its greatest enemy. Cocoa-nuts are rare. Among the other fruits may be mentioned, limes, tamarinds, bairs, *bêl*, *papya*, pomegranates, figs, mulberries, *tipparees*, *karindo*, *kamranga*, guava, *phooti*, *chinar*, *belpooi*, *amja*, *kru boobee*, and *looklookee*.

I have just mentioned all the cultivated produce of the plains of Cachar, as far as I am acquainted with them, and with the process of rearing them. I will now notice those of the hills, with the method of culture practised by the Kookies and Nagas. These hill tribes inhabit several of the low ranges of *teelahs* which intersect the plains, and the mountains which lie to the North and East. They are separated into village communities, each numbering from twenty to three and four hundred houses. The dwellings are closely congregated in clumps, and generally crown some knoll or high ground in the neighbourhood of the jungles best suited for cultivation. Early in the cold season this jungle is cut down by large parties of the cultivators, and allowed to remain on the ground to rot and dry for several months. It is then burned, and the soil lying below mixed with the ashes. The stumps of the bamboos or the trees are not extracted, as they serve to keep the soil together on the slopes of the hills, but the seed is thrown in between them, nor is care taken to allot separate beds to the different vegetables, but paddy, sugar-cane, tobacco, cotton, cucumbers and yams are found growing in the same fields. The harvest is reaped in September or October, sometimes as late as November and December, and the same fields may be. made to yield for another year or two. When the land is considered exhausted, fresh jungles are cut, and spontaneous vegetation allowed to cover the old fields. Bamboo jungle springs up in its old locality, and the site is ready to be again brought under cultivation in the course of seven years, but tree forests require a considerably longer time. The rice raised by the hill tribes is of different kinds and qualities, each tribe having a variety of its own. That of the Kookies is considered the best. The increase is not more than from ten to fifteen-fold, and the quantity raised barely sufficient for the consumption of the cultivators. Cotton is the only article of produce in the hills which finds its way out of Cachar; it is also much used for local manufacture, and sells at from Rs. 2 to 4 per maund in its raw state. The cultivation of it might be much extended, by proper management of the hill tribes on the part of intending purchasers. The spontaneous productions of nature in Cachar are very abundant, and consist of timber, bamboos, cane, grass and reeds. The produce of the forests is alike open to all, no individual right of cutting existing, and government exacting no revenue upon such produce except upon exportation out of the district. For this purpose a customs ghat is established on the river at Sealtek in Katerskarrah, where all such articles pay duty before they leave the province.

Of the timbers of Cachar, I can say little except mentioning the names of the principal kinds. The best sort obtainable for all purposes is *jharul, (Lagerstrœmia Reginæ)* which grows to a very large size, and is made useful for all purposes, being alike durable above or under water, and when planted in the ground. It is much exported for the purpose of boat-building, and is the most valuable of all the woods in Cachar; the price varies according to the size of the tree. Then follow *nuggesur, Mesua ferrea* a hard, heavy and durable wood, the flowers of which have an oppressively sweet scent. *Ping,* also hard and heavy, but unsuited for contact with the ground. *Rata, hoorta, phoviva,* three timbers of excellent quality for general purposes of building, but yielding to immersion in water, or a position underground. *Goomair (Gmelina arborea)* is a tree applicable to all purposes; it grows to a large size, and has a very delicate grain. *Kuttal (Artocarpus integrifolia)* has also a fine grain. *Cham* and *Seel cham* are the largest trees of the forest, and grow to enormous sizes, their wood is stout and strong, but coarse. *Awal* a hard but small species of timber. *Boora* used in making canoes, also *hortakee* and *jam* and *julla* for house posts, *moowal* and *awal* are also burned for charcoal. Besides these there are many soft and useless varieties used only as firewood. No care whatever is taken in replanting the forests, which are being thinned of their best timber, nor in conserving them, and I have seen fine forests of *jharul* timber falling under the ruthless axe of the Kookie, the ashes of which were to serve as manure to raise his scanty crop.

Of bamboos there is in Cachar a very great variety. The kinds most in use, and brought into cultivation by the inhabitants are called *burwah,* comprising three kinds, *seel*, *teli*, and *kanta*: *bentwa* comprising also three varieties *jumma*, *seel*, and *doloo*. Of these the first, *burwa* is the largest, growing to 60 or 80 feet in height, with a diameter at the base of 6 inches. The *bentwa* is a smaller species, the outer tegument of which, stripped off, is used as cane in binding. Besides *burwa* and *bentwa*, there are other cultivated varieties, the chief of which are called " *bākāl*, *jai*, *seel jai*, *khorikoit* and *meertinga*. Of jungle bamboos, the *phesa*, or giant bamboo, is the most imposing. This grows on high levels, and is met with nearly on the summits of the mountains. It reaches the height of an hundred feet or upwards, and has a diameter of from eight inches to a foot at the base, It is used as posts for houses, or masts for boats; and cut up is manufactured into choongas or vessels for holding water, &c. Smaller kinds of jungle bamboos, called *molee bans* and *doloo bans*, growing to a height of 30 feet, are those most in request, and are cut in large quantities for local use in house building, &c., and for exportation. They sell from Rs. 3 to Rs. 5 per thousand. A species called *bewoor* is in extensive use for mat-making, and two small varieties *nulli* and *durrol*, being almost solid, are applied to various purposes.

Of canes the varieties are even more numerous than those of bamboos. A huge cane called the *naga gola* grows in the mountains, measuring often 200 yards in length, with a diameter of eight inches. The *gola* and *latma*, are thick rattans of from one to two inches in diameter, much used in throwing bridges across the hill streams. The most useful kind of cane is the *jali*, and is sold in morahs or bundles containing 75 each at an anna per bundle. It is put into requisition for all common purposes of tying, and completely supplies the place of rope in the district. The *soodee bênt*, is a very fine thin kind, much used in ornamental work. The *rungi jali* is a coarse black sort, which warps much on being dried, besides which there are the *siddla*, *ouna*, and many others.

The jungles also produce reeds and thatching grass, both in extensive local use, and also cut for exportation. The former is found to be so profitable that the jungles containing it are taken up by private parties, and no attempt made to clear them for cultivation, sufficient return being had from the sale of the grass. One thousand bundles, each containing a hand grasp, may be had at about a rupee: and reeds sell for about three pice a coolie load.

Having made mention of the chief products of the country both cultivated and uncultivated, I will conclude my remarks by noticing a few articles which I think might be raised in Cachar without difficulty, and with profit.

The cultivation of tea has already been entered into, and a few maunds manufactured from the leaf of the indigenous plant, give great promise of the excellence of the article when made from shrubs improved by cultivation. An attempt was made to cultivate coffee in Cachar some twelve years ago, and failed simply from want of funds on the part of the speculators. The plant, which is indigenous to the soil, grew luxuriantly, and was just commencing to make small returns, when the house in connection with the concern at Calcutta failed, and jungle was allowed to choke the promising plantation. The coffee was of an excellent quality, and many of the trees, in spite of the neglect in which they have been left, continue bearing to this day. I am convinced that properly conducted coffee cultivation in Cachar would rival that of tea, in point both of excellence and profit. Arrow-root is found to grow well in the soil, and if cultivated in quantities would yield fair returns. *Arhur dholl*, from the few specimens I have seen, would seem to promise great increase. The cultivation of sugar-cane and cotton might be extended with great profit. Potatoes would grow as well in the high lands of this district as they do at Chera Poonjee, and it is my belief that oranges would be successful at the foot of the hills.

But the people themselves are so well off and contented, that they have no desire to extend their cultivation, and therefore all additions to the productions of the country must be introduced by new settlers, or by enterprising Europeans, whose experience in agriculture give them fair chances of success. I am happy to say that the prospects of Cachar are in this respect at present very bright, and great as has been its advance in civilization and progress within the last twenty-five years, that advance is likely to be eclipsed in the future. Much of the present prosperity of the district is owing to the indefatigable exertions of the present Superintendent, Captain Verner, who has administered to it for the last eight years, and who has during that short time doubled the revenue, and the extent of cultivated lands; so well also has crime been suppressed by that able officer that the statistics of no country in India offer a lower average, and heinous offences are almost unknown.

To his extended knowledge of this district, I am indebted for much of the information which I have given in these pages.

CACHAR,
July, 1856.

APPENDIX, No. I.

Showing the gross amount of revenue derived from the Province of Cachar for the year 1856-57.

Land Revenue, ... Rs.	74,378	1	9
Julkur or Fisheries,..	834	8	0
Sealtek Ghât Customs, ...	9,050	0	0
Horse tax, Hill tribes, ...	3,088	0	0
Salt Wells, ...	873	0	0
Abkāree,—1855-56, ...	14,818	8	0
Judicial Fines, ...	328	4	0
Annual Revenue, Rs.	103,370	5	9

To this must be added the profits accruing to Government from the capture of elephants, say one hundred elephants a year, at an average value of Rs. 400 a piece, after deducting the expences of *kheddah,* Rs. 40,000, making in round numbers a total revenue of Cos. Rs. 1,43,500.

The area of settled lands in Cachar, exclusive of those lately granted to tea planters, and those cultivated by the hill tribes, amounts to 29,866 *koolbas,* or about 1,50,000 acres.

Rice lands when unreclaimed are granted rent-free for the first three years; afterwards paying at the rate of one rupee per *koolba,* for the first, two rupees for the second, and three rupees for the third, and each subsequent year.

Should the position of the land be bad, or the ground itself uneven, it is granted rent-free for five years, and never assessed beyond Rs. 2 to Rs. 2-8.

Tea lands are granted on a much more favorable tenure, but a less area than 500 acres is not grantable on the same terms. One fourth of the grant is exempted from assessment in perpetuity, the other three-fourths are rent-free for the first fifteen years, after which they are assessed at three annas per acre for ten years and for seventy-four years at 6 annas per acre: the whole term being fixed for 99 years. One eighth of the land is however required to be cleared and cultivated by the expiration of the fifth year, one fourth by the expiration of the tenth year, one half by the expiration of the twentieth year, and three-fourths on the expiration of the thirtieth year.

Many thousands of acres have already been taken up for tea cultivation, and an immense area still remains to be occupied.

The Cachar fisheries are very trifling, and consist in jheels and nullahs, the large rivers being unassessed. Quantities of fish are to be had in the Soorma, but the inhabitants are not expert in catching them with nets, and trust chiefly to basket-fishing, and hand nets in the jheels and nullahs. A small species of fish about the size of a minnow, swarms in the paddy *khates* and ditches, and is caught in hand-nets. The price of good fish in Cachar is about four pice a seer.

For the Sealtek Ghât Customs, see Appendix No. III.

The hill tribes pay no land tax, but are assessed by the number of houses in their villages. Each house paying one rupee per annum. The cotton raised by them is therefore subject, on exportation, to certain duties at Sealtek, it being the produce of lands from which no revenue is derived.

The salt wells are getting out of repair; some expence is necessary in putting them in proper order, and private parties are unwilling to take the burden upon themselves. As Government would derive a greater profit from the sale of its own salt, than it does from the lease of these wells, were that salt sold in Cachar, instead of the produce of the wells, it has no object in repairing them. The brine yields a considerable percentage of salt, and sells for a pice a ghurrah-full.

The Abkarry revenue is increasing very rapidly.

Judicial fines in Cachar seldom or ever exceed a few Rupees each.

APPENDIX, No. II.

The expences of administration and collection in the district are as follows for the year 1855-56.

Judicial, ...	Rs. 19,502	0	2
Fiscal, ...	10,549	8	0
Kookie Levy, ...	21,400	0	0
Annual expenditure.	Rs. 51,451	8	2

The Kookie Levy is a civil corps, 214 strong, raised chiefly from among the tribe whose name it bears. It is distributed along the frontier to the North and South, to keep the tribes of Shooshais and Angamie Nagas in check.

APPENDIX, No. III.

Rates of duty on exports at the Sealtek Ghât;

	Ans.	P.
Cotton, per maund, ...	10	2
Bamboos, per thousand, ...	8	6
Jharul timbers of all sizes, each, ...	7	0
Other timbers under 16 cubits, ditto, ...	2	8
„ „ above „ „	6	11
„ „ „ 17 „	9	7
„ „ „ 18 „	12	10

		Rs.	Ans.	P.
Other timbers above 19 cubits,		1	1	1
,, ,, ,, 20 ,,		1	5	4
Canes, *Jali Bēnt,* per 100 bundles,		1	1	1
Ditto, *Soondi Bent,*		1	5	4
Thatching grass, per 1,000 bundles,		0	3	9
House posts, squared, each,		0	0	10
,, unhewn,		0	0	3
Rafters,		0	0	4
Beams,	per pair,	0	0	10
Reeds, per 100 bundles,		0	5	4

The Sealtek Ghât is farmed out by Government, being put up to auction annually.

APPENDIX, No. IV.

Estimate of the probable amount of exports and imports of Cachar :-

Exports.

Dhān or Paddy,	4,50,000	maunds
Rice,	90,000	,,
Sersoo, or Mustard Seed,	24,000	,,
Teesee, or Linseed,	4,000	,,
Teel, or Sesamum,	3,000	,,
Cotton,	3,000	,,
Jharul wood,	4,670	timbers.
Other woods,	10,474	,,
Doouls, Canoe Tree,	308	,,
Bamboos,	6,24,825	,,
Cane, *Jālee,*	29,600	bundles.
,, *Soondie,*	1,550	,,
Reeds, *Khag* and *Eekur,*	13,960	,,
Thatching Grass,	32,73,650	,,
Betel nuts exported to Munipoor to the value of about, Rs.	12,000	0 0

IMPORTS.

From Munipoor, Buffaloes,	1,000	heads.

Note.—The above estimate has been derived chiefly from the statistics of the Sealtek Ghât.

R. STEWART.

A few remarks on experiments with Silk-worms, with a view to improve the present Silk-yielding species of Bengal, by engrafting on them the very superior properties of the best French and Italian races, but without altering the rapid succession of generations of the Indian insect: *by* F. BASHFORD, ESQ.,

I have devoted my attention to silk-reeling in Bengal for nearly twenty years, and have labored hard to produce a thread as fine, as perfect in the reel, and as well suited for manufacturing purposes in Europe, as French and Italian silk. I have succeeded so far as to merit the medal of the Society of Arts for my comparatively superior quality over other Bengals, none for many years past approaching Surdah (J. and R. W. mark) by several shillings per pound in value. My reel has considerably surpassed China, and come up very close in the finer sizes to middling Italian in its various appliances and value, as a reference to any price current, or manufacturer in England or Lyons, will corroborate. Still I find that I am far behind the finest sizes of both France and Italy, and with a view to approach more nearly to them, I have imported eggs of the finest cocoons reared in both those countries, with a view to engraft them upon the different species of worms indigenous, or at present, common in Bengal; and I received also a large quantity of the best China eggs with the same view, as the cocoons of that country are also superior to all we have in Bengal, notwithstanding their silk is inferior.

I am desirous to give the result of my exertions to the public, as it may be a guide to others, and in giving myself this flattering introduction, it is to shew that the experiments have been made by a practical man, who has charge of

40 filatures, working 4500 basins, and therefore interested in their favorable results, and in any good that may accrue from the publicity of these remarks.

To enable my readers to understand the subject thoroughly, I will commence by mentioning that all our worms in Bengal for filature silk give us several crops of cocoons during the year, except a solitary species of annual, origin unknown, and rapidly becoming extinct.

The chief worm is what is called the *dasee*, or, as the word implies, *country*, and I therefore conclude it to be aboriginal or indigenous; it supplies nearly all the cocoons of the large November *bund* of Bengal, and yields the finest silk. The cocoons are small, and it is therefore sometimes called the *chota poloo*, or small worm, in some districts. The produce of the best quality may be taken at about 10,500 cocoons to the pound of silk. This worm thrives best in the cold weather, and the cocoons are better then than the after crops, but it continues more or less in the different districts throughout the year; the period from the hatching of the egg till the completion of the cocoon of this worm is about thirty-six days in the cold weather, but much less, as the heat increases.

The next species of importance is the *madrassee;* the native meaning of this word is *sea-born*, and I therefore conclude this to be an imported species; it is sometimes called *nystree:* it is produced throughout the year, but thrives much the best in the hot weather, is remarkably hardy, and easily and economically reared. From this species we derive in the March and rainy *bunds* a very large supply of cocoons; the produce is comparatively better than the *dasee*, about 10,000 of the best cocoons being required to produce one pound of silk, but the fibre is neither quite so strong, nor the color so bright; it nevertheless produces a very good thread, if carefully reeled. These worms pass through their stages so rapidly that from the time of hatching to the completion of the cocoon is frequently not over twenty-five days. Thus you see two distinct species of worms providentially arranged for our different seasons, yet continuing all the year.

The next is the *boro poloo*, or, in English, large worm; this is an annual, and I cannot trace its origin, it existed when the East India Company first imported Italian eggs, all of which soon failed. The *boro poloo* is now chiefly found in the Radnagore district, and from this worm they get much of their March *bund*, but it is failing fast. It used to exist in other districts, and the silk from it was very beautiful, and the produce double that of other cocoons, but from frequent failures, irregular hatching, and greater expense in rearing, and being an annual worm only, the natives have taken a dislike to it, and I fear it will soon be as scarce in Radnagore as it now is in other districts. They have another species of worm in Radnagore called the China, but how it acquired that name I do not know, as in China their worms are annuals, and this is not; the cocoon is certainly unlike in shape, and very inferior to the China, and even inferior to our *dasee* and *madrassee*. I have now described the best species of our Bengal silk-worms, and shewn that it requires 10,000 of our best cocoons to produce one pound of good silk; in France 2,500 cocoons produce the same quantity of silk. This disparity in produce between the Bengal and European cocoons must forcibly strike every reader of this paper, and the natural suggestion will be, that if Bengal could produce cocoons equal to French or Italian, the quantity of worms now reared would nearly supply the whole of Europe with silk. Actuated by a desire to improve our cocoons, and seeing no reason to doubt the possibility of it in a country so bountifully supplied with mulberry, and every convenience for rearing worms as this is, I imported a large quantity of the best French, Italian, and China eggs to engraft upon the different puny species of the Bengal monthly race.

I have no desire to introduce an annual, as this is a worm only intended by nature for cold climates, where there is but one crop of mulberry in the year; here we no sooner cut down our bush mulberry, than it springs up again, and in five or six weeks we have a second luxuriant crop. In a country therefore so bountifully and continually supplied with mulberry, an annual worm (which at best is always irregular, if left to nature,) is not required, and would not be encouraged by the natives. I imported the annual eggs merely for one crop of cocoons, that I might have the moths to couple and cross upon our Bengali monthly race, and give new strength and vigor to that, and I now proceed to explain the nature of my experiments, and their results.

In February, 1854, I received per overland a large quantity of the best French silk worms' eggs, they were however indifferently packed, and only 5 or 6000 eggs were good, out of a very large parcel. Some of these commenced hatching about fifteen days after the box was opened, with the thermometer ranging from 60 to 70° Fahrenheit, and they continued hatching very irregularly for about three months, during the latter part of which time, the thermometer at mid-day reached about 100° in the house.

I treated these little worms precisely as the worms of this country, feeding them at first, with finely cut, tender mulberry leaves, giving the larger and older leaves as they increased in size and strength. They fed and thrived very well, displayed a better constitution, and more hardy nature than our country worms, their stages of sickness were in the colder weather at about 7 days' interval, but more rapid, as the heat became greater, they got over them very well, and but few died until near the time of spinning, when the usual disease attending our country worms attacked some of these, and from which they chiefly died.

Recovery is very rare, as we have no remedy for these diseases; the usual fumigations were tried, but with little success.

The healthy few of the early incubations, astonishingly large and strong, compared to our country stock, were placed to spin in similar mat frames, as are used by the natives, in their rearing establishments (as I wished them from the beginning to become habituated to the most convenient customs of this country) and they gave very beautiful cocoons, some quite equal in size and firmness to the samples received with the eggs, and seemed to spin in our frames as easily (these mat frames take up little room, and are vastly more convenient than twigs) as they do on the twigs in France.

I was quite pleased with the cocoons, and the natives were truly astonished, they had never seen any like them; the later worms, having to bear extremely hot weather, did not succeed so well. The irregularity of hatching was very inconvenient, and in referring to the old East India Company's experiments, I find similar complaints of their Italian eggs, (but they never attempted to cross and naturalize, as I am doing.) Having so far succeeded with the cocoons, I allowed the moths to eat out, and obtained both male and female moths of our *dasee* and *madrassee* stock; and paired the French male with the country female, and the country male with the French female. The disparity of size was immense, however, impregnation was effectual, and the eggs were deposited in due time, and both pairings alike gave eggs of a yellow color, when deposited, the French female a darker yellow than the country female; but after three days, those from the French female and Bengali male turned dark, and remained unhatched until the next year, passing through our hottest season with the thermometer frequently at 105°. Here was my first disappointment. The eggs from the French male and country female remained yellow until the seventh day, when they displayed a slight dark speck, rapidly changed to slate color, and all hatched about the tenth day. The young worms were strong and healthy, and fed well, but were more rapid in their stages, owing as much perhaps to the warmer weather, as to their altered nature. The same diseases attacked some of these a few days before spinning, which had proved fatal to a few of the first batch. The operation of spinning was more tardy, the cocoons more flossy and less firm than the original; they were quite as large, but altered in shape, being very round at one end, and pointed at the other, without the least contraction in the centre, or shewing much resemblance to the French, except in the fibre; still there was a vast improvement upon the Bengali stock. These worms, from the time of hatching to spinning, occupied about thirty-four days.

I kept most of the cocoons for seed, pairing nearly all of them in themselves, fully expecting that this one cross would suffice, and realize my wishes of improving our breed, without altering their nature of hatching; however, I was sadly disappointed, for, on the third day, all the eggs turned black, and remained thus until the following year. The very few of this cross that I did not pair in themselves, were paired with indigenous moths, making a second cross for the French male; of these the cross female with the country male, followed the steps of the preceding. The cross male with the country female hatched, but owing to very bad weather, I did not succeed in getting any cocoons to continue the family, and thus ended all my labors in this department for the year 1854. I reeled off a few of both the pure and cross cocoons that I had reared, and the silk was quite equal to the best French; the cross cocoons, though changed in shape, gave nearly as good produce as the pure, and as strong a fibre. The change in the shape did not in any way detract from its produce, or reeling quality, which is generally supposed to be the case on the continent. As I before remarked, I had Italian and China eggs, and the result was precisely the same as the French. It may be asked why I imported China eggs, when the China silk is inferior to our own reel? My reply is, that China cocoons, although small, are infinitely superior and have more silk upon them than the best of our own *dasee* and *madrassee* sorts; and in my opinion, capable of making, with good management, as fine and valuable silk as Italian: and the reason the Chinese reel inferior quality from them is entirely owing to their own bad management.

I commenced the year 1855, with the first cross French, Italian and China females upon our *madrassee* and *dasee* stock, and second cross French, Italian and China male produce upon our females, which had gone back to annuals, and about the time these eggs began to hatch in January, 1855, I received another large supply of French eggs, which were hatching on arrival; they were in beautiful order, having come out on cloth loosely packed. I had now such a quantity of eggs of different sorts, that it was very difficult to keep them separate; however, they had as much care bestowed on them as possible, incubation of all the crosses went on as irregularly as with the first importation, and it was several months before any one batch had finished hatching. This year's experiments were interrupted by my being ill, and compelled to go to England for a few months, but a great many cocoons were obtained from the different crosses, and paired in themselves, which gave eggs that turned black and remained *in statu quo* until the next year; a few of the pure French were kept pure, but some were crossed upon the last year's crosses, and the result left unknown until incubation the following year. There was very little difference in the cocoons over last year's; .the offspring of the China female retained its original white color, although crossed upon yellow cocoons, but the shape altered to a point at both ends, the cocoon, was larger, and the fibre seemed as strong as the parent cocoon, as was the case with the fibre of all the other crosses. This was a very unfavorable year for experiments, and many thousands of the worms died.

On my return from Europe, I found a good supply of healthy looking eggs of the different sorts, and have continued the exepriments this year (1856) with unabated perseverance; they began hatching early in January, but just as irregularly as before, a small quantity only came out daily, and did not cease till May. The early worms were all good, fed and thrived as well as I could desire, and the cocoons from them were very fine. I had an opportunity of again comparing the pure French cocoons reared by me with the different crosses, and the choice was greatly in favor of the pure; but the cross cocoons were vastly superior to those of Bengal, and what I reeled off in the filature, gave a most beautiful silk, and a yield in quantity more than twice as large as the common cocoons of this country, which we were then reeling in the filatures. Thus, much of the intrinsic value of the French cocoon remained, but none of its original shape. I supposed now that I had so much reduced the original nature by the frequent crosses, so as to be nearly certain of their now assimilating in habits, &c., &c , with our country worms, and I did not reduce them by further crossing, but allowed the moths to couple with themselves. Great was my astonishment to find after the eggs had been deposited three days, that most of them turned black, indicating that they still had too much French nature; a few remained yellow, and hatched after ten days: how to account for this freak of nature with regard to the rest, I cannot understand, but I had still to be more surprised after this. I have to wait of course until next year to see the result of the black eggs, but those that hatched gave me ample occupation for the time, and I watched and cared for them with the greatest interest; the young worms looked healthy, ate, and throve well, and in due time gave cocoons, the white color alone proved the China portion, and the superior size of cocoon and fibre, and lighter color of some, with less floss than with our common sorts, shewed the French and Italian cross.

I was, on the whole, satisfied with this crop, and trusted my labours had met with success, but, great was my astonishment, after the pairing, to see more than half of these eggs again revert back to annuals, though there had been a complete break in their nature by their having hatched in January, given cocoons in February, eaten out in due time, paired in themselves, deposited eggs that ten days after hatched, and now to fall back, not to hatch again until the ensuing January, 1857, I fancy is extraordinary in the extreme. From the portion that hatched, I had another crop of good cocoons, and their eggs I distributed to several parts of India. Strange to say, many of these reverted back to the nature of annuals, and owing to bad weather, very few were left to me to continue my experiments. I am now in the midst of the rains, our worst season for cocoons, but still I have these few, and am bestowing on them the greatest possible care; what may be their ultimate fate I must leave for a future communication.

I have many pounds of eggs of the different crosses still retaining the nature of annuals, but as I have spent three years in trying ineffectually to engraft a superior nature, and invigorate our common stock without changing their nature of hatching, I feel discouraged, and would gladly have the opinion of naturalists, as to the probability of my object ever being attainable, and the proper steps to be taken for realizing it.

I have every belief in the possibility of improving our Bengal silk-worms under a better system of management, and have no doubt those of Europe have only acquired their present perfection by care and tuition; the superb cocoons I saw at the late French Exhibition were a proof of what art and careful management can produce.

Silk-worms are said to have been originally imported from China. I have lately seen specimens of the best domestic cocoons now reared in that country, but those common in Europe are more than double their size and weight in silk, thus clearly proving that the worm has either degenerated in its natural country, or that European skill has worked the vastly improved change in its nature and constitution. This latter I think is the truth, the main difference in the cocoon is in the size, the shape is still much alike, I however allude to the China white cocoon only.

In Syria, the cocoons are in size and quality nearly equal to French, and as their climate is not far different from that of Bengal in our dry season, I see no good reason why we should not be able to produce as fine cocoons.

A long and tedious system of crossing may be necessary to work the change, but whatever labor is required, the immense improvement in quality and produce, that is certain to result from such, would amply compensate for both labor and expense, and as the gain would be a public good, the Government and public should encourage the undertaking. I am willing to present eggs to any one disposed to follow my steps, and the more diffused the experiments, the better chance of success.

I am not satisfied that the present domestic races of silk-worms were not originally wild, and fed on other food than mulberry. The forests of India teem with various species of silk-worms, feeding on all sorts of leaves, accident may have led to the choice of mulberry, and it certainly is the best suited for yielding a mellow and easy winding silk. I have not been able to make any experiments on any wild silk-worms, except on the *Bombyx Huttoni,* but I believe it possible to domesticate a great many of the wild species, and by changing their food, to make them produce a silk' less harsh and crude than they now do, and cocoons that will yield their thread freely, without the aid of alkali* or other chemicals, just as the domestic worm does. The Société Zoologique D'Acclimation are producing wonderful changes, and why should not we do the same in silk-worms? I see no good reason to the contrary.

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* The object of the alkali, soda soap, or such like, is to soften the outer gum of the thread of the cocoon, and enable it to run off freely. A variety of substances are used by the natives, who reel the tusser and other wild cocoons, the gum of which is excessively hard, and with all these aids they reel very indifferently. A solution of soap is often used in filatures in Europe, to facilitate the reeling of the domestic cocoon, but when the water is naturally soft, this is hardly necessary. Silk is entirely a gum, or glutinous substance. I have extracted it from many hundred worms in every stage. It is deposited in both sides of the worm in two cylindrical shapes, doubled into three layers or folds, thick in the middle, and tapering at both ends, but much more so at the latter end, and which accounts for the end of the cocoon giving a thread of a finer and lighter color; the gum as instantly taken from the worm, may be pressed and moulded into various shapes, and is very elastic, but very slight exposure gives strength to it, and fixes the thread in the ratio of the cylinders, large in the centre, and tapering at the ends; if you expose it to a hot sun, the softer and coloring gummy matter becomes brittle, and may be broken off, or separated, leaving the fixed gum in the shape of a thick white thread, strong (if not too much exposed to the sun), and slightly elastic. At the time of spinning, the two cylinders unite in one aperture, and the gummy matter is exuded by the worm in one continued thread; the more stickey nature of the soluble portion fixes the thread to the twigs at first, and ultimately to each other in the formation of the cocoon; the motion of the head of the worm, causes it to be drawn out from the cylinders; the peculiar nature of the worm's secretion, and the motion of the head, enables it to elongate the silky gum, as it is drawn from the body in a soft state, into a thread of considerable length; exposure immediately hardens and fixes it, but it can only be done by the aid of the outer stick and more soluble gum. The two gums, or animal secretions, differ most materially, the one must be boiled out with a solution of alkali, before the other will take a perfect dye, but this solution does not injure the fixed gum or silk thread, a more powerful chemical is necessary to render that soluble; it *is* soluble, and art may make old silk dresses available some day for weaving and converting into a new fabric, as our Yorkshire friends now do with old woollen cloth rags.

As this paper may fall into the hands of practical people in Europe, who may be disposed to aid a good object, I will subjoin a few remarks upon the mode of rearing silkworms usually practised by the natives in Bengal. I am not sure if their defective system could be remedied, whether the produce of our present stock of worms could not be vastly improved, and render the importation of foreign species unnecessary. These remarks will enable my readers to form an opinion on the subject, but I must mention that the natives are so pertinaciously callous of improvements, if they involve any labor or expense, and are almost as immoveable in their prejudices as the Pyramids, that unless any beneficial changes can be effected in a most simple and inexpensive way, I have little hope of their attempting and persevering in them.

In the first place I will try and describe the mulberry, and mode of cultivating it. The sort chiefly grown here is the wild black species, both the indented and unindented leaf, planted indiscriminately, a handful of cuttings of both or either sorts forming one bush, and these bushes in rows, about a foot apart, cover large tracts of ground. The natives care little about the species, or trouble themselves to test which is best suited for the worms, suffice it to say, they follow the customs of their forefathers, and that satisfies them : they however bestow much labour on the cultivation, and from well managed lands, get several extraordinarily large crops of leaf during the year. It is cut every time close to the ground, and after a little hoeing, it springs up again most rapidly; the leaves are cut into small pieces for the very young worms, but after that stems and all are given, just as it comes from the field. As far as I can judge of the mulberry, it is quite as good for feeding worms and producing silk as the large tree mulberry of Europe. Certainly the French and Italian worms I fed on it gave cocoons quite as good, as the specimens that accompanied the eggs.

Mulbérry is very expensive, and the natives are prone to half feed and stint their worms in consequence, to the great injury of course of the cocoon; it is sufficient to them if they have quantity, they have less regard for goodness of quality in any thing.

In the selection of eggs, there is a great choice in India as to the period for incubation, but the cocoons being alike in every district there is little choice as to quality. In one part or other of Bengal, worms are spinning nearly every day in the year. But in the rains, fewer worms are reared from the lower lands than at any other period, partly because the mulberry is frequently subject to inundation, and partly from the rice crops at this season demanding more attention. At this present moment, (September 15th, 1856,) most of the mulberry in Bengal, and very many of the filatures also, are some feet under water. The inundation begins to recede in September, and by the end of October, the surplus mulberry is cut and thrown away, and the lands in a forward state of cultivation early in November, about which time the majority of the rearers procure the cocoons, from which they get the seed for the November Bund, the largest we have in the year. Eggs are not sold here as in Europe, seed cocoons are sold instead; the rearers pair the moths, and manage them as they like; they have no fixed system; when seed cocoons are dear, the good and bad are all equal in their estimation; they pay high for them, and cannot afford to sort or lose any, such is their reasoning. Rearing houses in Bengal are of mud, or mat walls, and straw roof; they are generally very small, and, notwithstanding the great heat, have no windows or ventilators, or any thing to light the room, except a single fine lattice screened doorway. They are alike indifferent to light or temperature, to light particularly, and they have some reason for this, for without thick screens of lattice net-work, the flies would enter, and destroy every worm in two or three days; even now millions are destroyed yearly by flies entering the room at feeding time, and many a batch of apparently good cocoons overnight, have been found destroyed in the morning by maggots coming out of them from fly-blows on the worms before spinning. In very cold weather, I have known fires used by a few at the doors of their rearing-houses, but very rarely, and the good is questionable for such unventilated buildings. The dung is generally spread on the floor to heat the room. The fluctuations of temperature in Bengal are considerable during the year, and even in the twenty-four hours, frequently as much as 20°. No attempt is made to equalize it in the rearing-houses, which are crammed with worms, and are necessarily close and offensive; our worms therefore, passing through all these disadvantages, at once proves their hardy nature. From worms generally indifferently fed, and reared in masses, in close, unventilated and unhealthy houses, you cannot expect the best cocoons, but from the very few independent and most careful rearers, we do sometimes get very fair quality, from fifteen pounds of which, or about 9500 cocoons, you may reel one pound of very good silk, but every batch of cocoons varies so much in quality, it is impossible to fix an average. The rearers are generally very poor people, and the larger portion of them rarely produce over one hundred ℔s weight of cocoons each bund; many even less, and they too often exceed their means, and stint their worms in accomplishing this. The tendency of the larger rearers is the same way, they rarely calculate their means, and attempt to rear a larger quantity than they have either space or food for, and satisfy themselves with quantity rather than quality. Barring these few exceptions, the majority of silk rearers are in the hands of money-lenders, who charge from 20 to 30 per cent. for the accommodation, which would absorb all the profits, if instead of employing their families, they had to hire labor. Few or none of them, as may be supposed, reel off their own cocoons, and as they have no means to bear the loss should any arise, from attempts to improve upon the present system of rearing, they do not trouble themselves about it; and if we (Europeans) desire to see any improvement in the cocoons, we must bestir ourselves to effect it, and when the extra profit is palpable to the natives, they will doubtless come in and reap it. With cocoons such as we now have, and treated as they now are, we cannot reel a better silk than I have accomplished. I have seen our Bengal cocoons reeled at a first-rate filature in France, and a better thread was not obtained there than we can command here. Our operatives are not at all inferior in ability to Europeans, but they are not half so tractable or careful, and in this is our greatest misfortune, and being a national failing, it is most difficult to surmount. The rich native reelers encourage it; their great aim, as in all other things, is the largest quantity for the smallest price; they have no regard or estimation for quality, and the cocoons from which I get barely one pound of silk, they would get one ℔ and a half at least, and at much less expense for reeling There are so few Europeans in Calcutta who know any thing of silk, that the natives find no difficulty in selling their trash at profitable prices, and are consequently formidable competitors with us for cocoons, and create opposition from the operatives, who would far rather take employment where they can reel carelessly, than come to our better regulated establishments, where strict attention is demanded from them. However we cannot complain of the native filatures, if manufacturers at home will buy their trash at profitable prices to them. They are quite right in attempting no improvements.

The general treatment of cocoons in this country before reeling them, is also bad in the extreme. The French and Italian are never exposed to the sun, but merely dried in well ventilated rooms; in Bengal, they are usually sunned till they are as dry as chips, then baked and sunned again, more or less the gum undergoing baneful changes. The colour becomes faded, the fibre reduced in strength, and deprived of elasticity. The worm is so dried up as to have no weight to keep down the cocoon at the time of reeling, and the thread consequently comes off less clean than it might; and as to sorting the cocoons that is quite neglected, it would reduce the produce. The practice has been handed down from generation to generation, and I have had the greatest difficulty in altering it in the Surdah filatures, and other Europeans, I fancy, have found the same difficulty in their establishments.

Surdah Silk Filatures,
December, 1856.

*On the Chinese mode of making Green Dye from a species of Rhamnus**; *communicated by* R. FORTUNE, ESQ.: *with a few remarks on the treatment of the plant as pursued in the Society's Garden, by Mr.* J. MCMURRAY, *Head Gardener.*

My friend Dr. Lockhart, of Shanghai, has sent me some most interesting information regarding the Chinese mode of making the green dye so much prized by the French manufacturer. This information was obtained from the Chinese by the Revd. Mr. Edkins of the London Missionary Society, while on a tour in the interior of the Kaingsoo province, and may be fully relied upon. I have very great pleasure in sending you the following extract from Dr. Lockhart's letter, and trust it will prove acceptable to the members of the Society.

"The bark of two kinds of the tree called '*green shrub*', one wild, which is called the *white*, and another cultivated, which is called *yellow*,—are used to obtain this dye. The white bark tree grows abundantly in the neighbourhood of Kea-hing and Ningpo—the yellow kind is produced at Tsah-kow-pang, where the dye is manufactured. This place is two or three miles West of Wang-heen, a market town a little to the South of Kea-hing.

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* "The Rhamnus yielding the green dye appears to be an undescribed species; at least I cannot identify it with any which is described in my books. I shall send a specimen home to settle the point." *Extract of a note from Dr. Thomson, Superintendent H. C. Bot. Garden, Calcutta.*

The two kinds are placed together in iron pans, and thoroughly boiled. The residuum is left undisturbed for three days, after which it is placed in large earthenware vessels, and cotton cloth prepared with lime is dyed with it several times. After five or six immersions the colouring matter is washed from the cloth with water, and placed in iron pans to be again boiled. The colouring matter is taken up in cotton yarn several times in succession, and then washed off and sprinkled on thin paper. When half dry, the paper is pasted on light screens, and thoroughly exposed to the sun. The product is called Lŭk-kaon.

In dying cotton cloth with it ten parts are mixed with three parts of sub-carbonate of potash in boiling water.

The dye made at Tsah-kow-pang is not used to dye silk, because it is only a rough surface that takes it readily. To colour silk with it so much of the material must be used that it will not pay; all cotton fabrics, also grass cloths, take the colour readily. *This dye does not fade with washing, which gives it a superiority over other greens.*

It is sent from Kea-hing as far as Shantung. About thirty men are employed in the manufacture of it in Kea-hing; it is also made in the province of Honan and at Ningpo, but not so good. It has long been used by painters in water-colours, but the application of it to dye cloth was first made only twenty years ago. If some method could be discovered of applying it to silk fabrics, it would become still more useful."

The above extract from Dr. Lockhart's letter, not only confirms all that I had formerly gleaned connected with this subject,* but gives information sufficient to enable any one to prepare the dye for himself. It also shews that the Chinese know and appreciate that quality of this dye pointed out by the French manufacturers, namely its being a *fast green.*

The knowledge of chemistry which our manufacturers possess, would probably enable them to devise some more simple manner of obtaining this dye from the bark than by having to take it up on cotton cloth and cotton yarn. They would also from their superior knowledge of mordants, be able, probably, to apply it to silk fabrics, which the Chinese are at present unable to do.

From the specimens of the bark sold in the market about Kea-hing (a few of which I forwarded to the Society) it does not appear the Chinese consider it necessary to go to the expense of stripping it from the stems. They merely cut them into short, convenient lengths, and boil wood and bark together.

To recapitulate then the Chinese process seems simply thus:—

1st. To take the two kinds, strip the leaves off them, chop them up into convenient lengths, and boil thoroughly.

2nd. To leave the residuum undisturbed for three days, and then put it into large earthenware vessels.

3rd. The colouring matter is then taken up by immersion of cotton cloth prepared with lime.

4th. After five or six immersions the colour is washed from the cotton, and again boiled.

5th. Lastly, it is again taken up on cotton yarn, and then sprinked on thin paper, and thoroughly dried.

R. FORTUNE.

In my report for May last, I promised a few general remarks on the treatment of the Chinese green dye plants, from the period of their receipt in the garden in March, 1854, up to the present time, which are as follows:—

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* Mr. Fortune's former communication is published in Part 1, Vol. IX, p. 105.—*Eds.*

On receipt of the plants,* they were put in pots sufficiently large to afford the roots plenty of room. The soil used was that which the garden supplies, with an equal quantity of leaf mould and sand well mixed together. When potted they were placed in a cool part of the conservatory, after which water was given in small quantities, according to the state of the plants and of the weather.

Under this treatment they made a healthy growth, and were transferred from the pots to the open ground in July following. This ground had been selected in a high locality of the orchard, and trenched two feet deep for that purpose. The plants were then set out in lines, three feet apart each way, and watered immediately after, merely to settle the soil about their roots. After planting, the ground was kept clear of weeds by an occasional hoeing between the rows, which also kept the surface of the ground open, and encouraged the growth of the plants. By the month of October the plantations had made a vigorous growth in the new situation, and then went to rest. Between that time and the end of December, the whole of the plants shed their leaves, and again in February began to push out fresh buds. At that time one portion of the plants was headed down to within six inches of the ground, for the purpose of making cuttings. a second portion was layered in the usual way, while a third portion was left in their natural way. Of the cuttings put down very few struck root while the whole of the layers succeeded.

The difference of growth however in the stools during the season 1855 was very apparent. Those that were headed over threw out a greater number of shoots than either the layered plants or those left in the natural state, and made double the length of shoots; the layered plants produced the next best growth, and those left to themselves made the worst growth of either.

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* These plants were sent by Mr. Fortune in the early part of 1854. A brief notice respecting them will be found at pages 91 and 105 of this volume of the *Journal*.—Eds

There was no other difference in treatment of the plantation during the season 1855 than that of 1854, merely keeping the ground clear of weeds, and giving an occasional hoeing, in order to keep the earth loose between the rows.

In February of the present season one half of the plantation was again headed down to within from three to four eyes of the old wood, and the other half layered. The difference in growth is again in favour of the stools which have been headed down, as may be expected; but the layered branches this spring have flowered, and are now bearing a small quantity of seed, which is more favourable, so far as increasing the plant goes, than that of heading down the stools for making cuttings; but the latter system of heading over the stools is what the Indigo planters will have to adopt for manufacturing the dye; and also to observe that the whole of the plants be headed down to within three or four eyes of the season's growth at the time of gathering the crop; which I would say will be ripe about the month of October.

There are two kinds of the plant, the wild and the cultivated, which must be mixed together to produce the desired colour; the latter variety is a very robust and vigorous grower, the former smaller in the leaf, and of a more delicate constitution; however both varieties grow freely, as will be seen from the accompanying shoot of each kind, produced since the 25th of February last, at which period the plants were headed over, the large branch (measuring seven feet in length) is one of fifty-four produced on the same plant. The question arises will the Indigo planters of Bengal be able to carry the Chinese Indigo plant into general cultivation in this country, and make a remunerative crop of it? I have every reason to believe they will, from the vigorous healthy state of the plants here, and that at a cheaper rate with less risk, than the Indigo plant of the country, (if the produce be as good,) by merely attending to the following suggestions:

Choose a high situation to cultivate the plant on; let it be well cleared of weeds, ploughed and manured thoroughly, before setting out the plants. Set the plants in lines from six to eight feet each way, keep the plants clear of weeds, and you have a plantation that will stand for a number of years. The crop I think will be ripe in October, and during the cold season the plough can be sent through the plantation, to turn up the soil; root up weeds, and place the whole under a proper system of cultivation.

It may be worthy of remark, that insects do not destroy the plant, and that the cattle in the garden, although feeding alongside of it, have never eaten a single branch. The number of plants required to plant a statute acre at six feet apart would be 1210; let us then suppose each plant, when fully established, would bear one hundred weight of branches, bark and leaves, and here we obtain off one acre of ground sixty tons and ten hundred weight of material to manufacture from, which the plants will yield, and more when of proper age. In fact any gentleman who knows the way to cultivate an osier holt, or plantation, will be able to manage the Chinese green dye plant, and can calculate upon the produce from that plant; only bearing in mind that this plant must not be grown in swampy situations, where the water rests about the roots for any length of time.

A. & H. SOCIETY'S GARDEN, J. MCMURRAY.
CALCUTTA:
July, 1856.

Notes on the premium offered by the Society for a new material for the manufacture of Paper: by MR. GEO. JEPHSON.

It is presumed that the premium will be given for a material that will produce paper adapted to the use of

Europeans; the conditions being that the fibres hall be as efficient and economical as rags, and calculated to produce a fine paper.

As far as Native wants are concerned there appears to be no necessity, or hardly any, for experiments, as the paper in general use with them is cheap, owing to abundance of materials, and better adapted, from its peculiar sizing, to the reed pen and viscid ink of the people, than any of European manufacture. Certainly one does not see European made paper preferred to their own, although much of what is imported from France is very cheap, and fine enough to meet the demand which may have been created by the half-anna postage.

But whether for European or Native use, persons disposed to compete for the premium will feel at a loss as to their chances of success, without a knowledge of the cost of rags, and the various other materials used in different parts of India for making paper; as that which is abundant and cheap in one part of India may be scarce and dear in another. Dr. Riddell has informed the Society that *Hibiscus esculentus* and *Hibiscus cannabinus,* from both of which fine paper is obtained, do not cost half so much as rags, but the relative cost of those articles is not given; cotton rags must be alluded to, no others being procurable; they are, at the best, but poor material, and it is believed but little used in India, where Native apparel is usually worn into such tenuity as to be almost worthless to the paper manufacturer.

According to the Chevalier DeClaussen, the requisites in paper-making at home are:

1st. Cheap material.
2nd. Easily bleached.
3rd. Strong fibre.
4th. Unlimited supply.

Those are points to which the attention of persons disposed to make experiments in India should be directed, if the object of the Society, in offering a premium, is to aid in removing what *Chambers's Journal* aptly styles "the paper difficulty" at home.

Happily India can do much towards the supply of materials, in the numerous varieties of *Junceæ*, *Cyperaceæ*, and other fibrous plants indicated by Royle, DeClaussen, Colonel Jenkins, Dr. Riddell, &c., &c. The magnitude of the aid required may be estimated from the fact, that the duty on excise at home is now levied upon upwards of 100,000,000 ℔s. of paper, to produce which upwards of 40,000 tons of rags and other materials must have been worked up.

Rags, giving 50 per cent of material for paper according to DeClaussen, were quoted in London, in November last, at 23 to 32 shillings per cwt. duty free, being 6 to 7 shillings higher than they were some years ago. No other material on which the Chevalier has experimented yields more than 40 per cent, most of the articles only afford 10 to 30 per cent, and nearly all, except the *Junceæ*, are difficult to bleach. In addition to a lower per centage of paper-making stuff, there is the freight to England to be taken into consideration; but on the other hand labor and raw materials are cheap in India.

Amongst the Indian fibres not experimented upon nor mentioned by M. DeClaussen, is that of the aloe, which is shipped to England from Bombay, as well as the West Indies. Aloe and plantain fibre were the materials chiefly relied upon by the paper-manufacturing Company started at Bombay two years ago, with what success I have never heard—not much, it is to be feared. The aloe, yucca, and similar plants give a strong fibre, but rather impracticable in color. Excellent ropes are made, in a coarse way, of the aloe fibre, in many parts of Behar, and used in raising water for irrigation and domestic purposes.

Of auxiliaries in a paper manufactory, no Indian material can surpass the *Daphne*, but although it grows freely throughout the Himalayas (most plentifully east of the Ganges,) it is feared that European demand would soon exhaust the supply, as the shrub is not of very quick growth. Only one species, the *D. mucronata*, grows in these ranges, and it is seldom seen as high as four feet. The Lamas at Pue, on the Busahir frontier, manufacture a coarse paper from the bark, but only as much as suffices for their own use. It is made more extensively in Kumaŏn, but is much inferior to that of Nepaul, as described in the *Journal of the Asiatic Society*, January 1832, and the *Agricultural Society's Journal*, Vol. 5, p. 228. It will be observed from those reports that the yellow tinge given to the pulp by the lye of the Nepaul paper-makers is not difficult to be removed, the *liber* of *D. mucronata*, is naturally white enough for any purpose, whether of cloth or paper.

Mulberry and bamboo paper have been referred to more than once, in the correspondence and proceedings of the A. and H. Society. They are "more curious than useful," as an authority on botany wrote some years ago of the *Cyperaceæ*, little thinking of the valuable uses to which they are now likely to be applied. Those who are curious on the subject, will find in the *Asiatic Society's Journal*, September, 1834, pp. 477-9, a description of the manufacture of paper from the mulberry and bamboo, according to the Chinese method. Something might be made of the bamboo, as it is abundant in Bengal, and to the eastward. Two or three species of mulberry, wild and cultivated, are found in these mountains, but not in sufficient quantity to be of use as an adjunct in paper-making.

Dr. Cannon, Officiating Inspector of Prisons in the Punjab, has been kind enough to send me a few small specimens of paper made in the jails under his superintendence, knowing that I took an interest in such matters. Three of the samples are made of *Boosah*, and one of *Boosah* mixed with the pulp of *Taut* and a jungle plant, called by the natives

Khippah. They are coarse, strong, and yellow-tinged, but fit only for envelopes and native writing. Two others are made from the tomentum of the *Chaptalia gossypina*, one slightly mixed with rags; both are of tolerably good color, but coarse and weak. The *Chaptalia* is in wild abundance on the grassy ridges of the Himalayas, during the rainy season, and would make a very fine paper, if properly treated, but the small yield, and cost of collection, as stated in Captain Huddleston's report, read at the Agricultural and Horticultural Society's meeting 8th September, 1841, shew that it is never likely to be valuable as a paper material. Captain Pengree sent the supply which has been manufactured to Dr. Cannon, and has also, I believe, sent some to England. The Inspector of Prisons at Lahore would no doubt send samples of the paper to the Society.

SIMLA :
6th September, 1856.

On the plant Gisekia pharmaceoides, as a specific in Tænia, or Tape worm: by Captain W. H. LOWTHER.

Although an article like the present sounds fitter for a medical journal, and only presents attractions to the practitioner and experimentalist, yet such is the power of this very common weed in curing the distressing and mysterious malady which has for ages baffled human skill, that I cannot refrain from communicating so important a circumstance for the benefit of mankind in general, and of those in particular who despair of a remedy. This small and obscure plant is to be found most ubiquitously throughout India and Egypt, often covering acres of ground: its favourite habitat being uneven places in dry waste lands, where it escapes being burnt up by the periodical hot winds, about which season it ripens its very numerous and minute seeds, which fall, and are spontaneously sown. At the first fall of the rains the plant totally disappears, and is not again to be found until the succeeding cold season. I have found it growing most profusely in the Cis-Sutlej territories, in the jungles near Ferozepoor, at Seharunpoor, at Cawnpoor, and throughout Oude; and Voigt in his catalogue gives Bengal. A *fuqueer* of Ferozepoor was the first person who introduced this medicine; he recommended it to Assistant-Surgeon Thomas Maine, then in charge of my regiment, who cured a very old case of Tænia with it immediately, after having failed entirely with European medicines: several times subsequently Dr. Maine gave the dried plant, of which he always kept a large supply, with *indifferent success,* and the reasons of which I shall describe. On three several occasions I treated a very obstinate case of Tænia, which had been pronounced incurable by several medical men in succession, without any apparent effect. The sufferer was a walking shadow, and every European and Native anthelmintic had been tried in vain: observing that the pungency of the dried leaves was most perceptibility decreased by age, I bethought myself of administering the remedy in its *green fresh* state, and met with the most perfect satisfaction as to the *total* expulsion of the worm. Gisekia has no *poisonous* qualities whatever; it merely containing an acrid volatile principle, which is thoroughly fatal to the disgusting parasite alone, and which neither annoys the stomach, or disturbs the digestive functions. My treatment is as follows. I prefer the administration of the remedy when the plant is forming its seed vessels (all vegetable products being then fullest of their medicinal virtues,) I ground an ounce, or more of leaves, stalks and capsules (taken indiscriminately,) in a mortar, adding sufficient water to render it liquid. The patient should fast for twelve hours previously, and three doses should be taken, one every four days: to destroy any latent germs, give, for precaution's sake, additional doses for two fortnights following. Probably some of your smart Calcutta chemists will be able to prepare an extract which will retain its virtues unimpaired. I have had considerable experience with tape-worm, and was completely unsuccessful in finding a specific until I tried *Gisekia;* the much vaunted remedies of *Causso,* (*Brayera Anthelmintica* from Abyssinia), *Pulas Papra* (*Dhak* seed,) and *Kameyla (Mezeroon)* I found, utterly *worthless, as lasting in effect.* According to African travellers every nineteen out of twenty Abyssinians are constitutionally subject to Tænia, and they merely employ the *Causso* to give *temporary relief,* being fully aware that it does not possess eradicative powers. *Causso* when first imported into Europe was a guinea an ounce, but here is a remedy beyond comparison, available alike to the rich man and the beggar, and to be had for the trouble of gathering, and as such I recommend it to the notice of the Society.

Report on the vegetable resources of the forests of Malabar: by Mr. W. G. McIvor, *Supt. Ootacamund Horticultural Gardens: in a communication to* T. Clarke, Esq., *Collector of Malabar.*

In acknowledging the receipt of your letter of the 30th ultimo, and with reference to the honour done me by your predecessor, in calling upon me for such information as I can afford on the subject of Dr. Balfour's Circular Letter, dated 1st July, 1854.

2. I have now the honor, in compliance with your wish, to forward you the following remarks which I had prepared for the late Mr. Conolly at his request.

3. The extensive forests of Malabar are well known to rank amongst the richest in Southern India, not only on account of the quantity, quality, and great variety of timber they produce; such as teak, black-wood, and many other kinds of woods well fitted for ship, and house-building,

cabinet work, &c., but also for its other trees, shrubs, fruits and herbs yielding gum, resins, kino, piney-varnish, piney-wax, oil, dyes, and medicines. To notice these in such a manner as their importance requires, or even so as to render my observations on them practically useful, is a task which I feel I shall fall far short of accomplishing, not having devoted sufficient time to the investigation of the natural products of the district; this, I regret much as the natural productions of Malabar are so vast, and so often overlooked, that the subject of making them known not only in this country, but also to the manufacturers of Europe, is one which must be highly gratifying to all who are interested in the prosperity of the district, and that of India in general.

4. The teak, although once abundant on the banks of the rivers in this province, is now nearly all cut down. In the interior of the forests, and on the sides of the hills there are many millions of fine teak trees which could be made available for all purposes were it possible to convey them to the rivers at such a cost as would be remunerative, such however cannot be done by the means now used,* as the expense of moving trees after they are cut down, to any great distance through the jungle, is so great, as to equal or even exceed the value of the timber itself, hence the expediency and utility of the extensive government teak plantations formed on the banks of the river near Nelambore.

5. These plantations were, I believe, begun about fifteen years ago, at the instance and under the care of the late zealous Collector, H. V. Conolly, Esq. The site is admirably chosen, affording access easily, unexpensively, and convenient for transport to the river.

6. The land now planted sufficiently proves itself to be capable of producing good teak. It was formerly the site of

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* This might be in a great measure obviated by constructing roads.

natural teak forests, and produced the fine trees which had for many years supplied the dock-yard at Bombay.. The health and vigour of these young trees, and altogether the present very satisfactory state of these plantations, at my last annual visit, covering over 2000 acres, abundantly prove that land which produces fine natural teak, when in a state of forest, will produce the same tree again equally well under cultivation.*

7. This important point being now fully established by these plantations, it is to be trusted they will be still further extended; not only in Malabar but in other Collectorates, as it is obvious that unless some system be adopted for the preservation and cultivation of our valuable indigenous trees, they must as a natural consequence disappear under the system now generally prevailing, *viz.*, that of cutting down indiscriminately and never planting insures this fatal termination.

8. As I have already remarked, teak of a large size can now only be had in the interior of the forests; having within the last few years disappeared from the banks of the rivers; and indeed from every easily accessible situation. Thus it is apparent the supply must decrease; and the price of any good timber become so much increased, as to destroy its marketable value. The benefits to be derived from the cultivated forests named, and any others carried out, will be very great, inasmuch as the trees can be easily moved into the rivers and floated to the coast for exportation; besides the advantages which cultivated teak possesses in straightness and freedom from knots and knees, so common to trees in natural forests.

9. The quantity of teak and other timber available, and desirable, for exportation in Malabar, perhaps exceeds that of any province in India. The quality of the timber also has long been famous, especially teak, black-wood, jack, ebony,

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* This fact is not generally known, and has been a disputed one.

rose-wood, and poonah-woods. With the exception of the teak, these woods are still plentiful in many of the Malabar forests. The black-wood proper, *beeta* or *vitee*, attains an enormous size near the Ghauts, where it may frequently be met with from 9 to 12 feet in diameter. The black-wood is much used throughout Malabar for making furniture, but rose-wood is seldom used. The two kinds of jack, (*Artocarpus integrifolia* and *hirsuta*,) are also plentiful throughout Malabar, and like the black-wood, much used for furniture and house-building. All of these are exported, though, with the exception of teak and black-wood, in small quantities. The poonah is occasionally exported in considerable quantities for spars.

10. Appended is a list of the specimen timbers sent me by the Collector. The quantity of these available for exportation is enormous, and are easily transported, as they are plentiful in many localities near the rivers, they in fact are the most common timbers of the Malabar jungles. The timber of some of these trees is very valuable, and none of them can be said to be useless. Their real commercial value, and the various profitable purposes they might be applied to, is a subject worthy of enquiry, and the specimens, by being tested, will form an easy and certain means of ascertaining these points.

11. I have added the botanical names to as many as I have been able to find specimens of their leaves and flowers in my collection of Malabar trees; but as no specimens of the leaves and flowers, and only the Native names alone were sent me with the specimens of wood, there are several species I have not been able to determine.

12. Next in importance to the discovery and application of indigenous productions, is the improvement of the resources of the country, by the introduction of various useful trees, shrubs, herbs, &c., such as are indigenous to other countries similarly situated. The success with which this has been

done in other countries argues for success in India also. For instance sugar, coffee, cotton, ginger, pepper, cloves, maize, lemons and plantains were introduced to the West Indies;—rice, cotton, &c., to America; the vine to the Cape. Hence the produce of plants introduced to these countries now form the principal source of their own wealth, staple products, and exports.

13. To India also various useful and interesting plants have from time to time been introduced; although on the whole with much less success than has attended their introduction to other countries; this may have been partly owing to ignorance of the nature of the plants and their proper treatment; also, to the want of care in selecting suitable localities for their culture, as also to a want of knowledge of the details of management so necessary to ensure success with newly introduced species, as well as to the non-employment of capital by the Natives for such valuable purposes.

14. Considerable success has however attended a few of the plants introduced to India; one may be instanced, Coffee, which now forms a considerable article of produce and export, there being at the present time nearly a thousand tons produced annually in Malabar, (Wynaad and Koondahs,) and this is rapidly increasing.

15. Coffee is almost the only introduced plant in Southern India that has progressed in cultivation in proportion to its value; many other plants have been introduced, and are now to be met with in several parts of the country in a very thriving state, such as bread fruit, the arnatto tree, *(Bixa orellana)* the baobab tree, &c., &c. The pimento, nutmeg, and cloves, although introduced to India in considerable quantities about 50 years ago, at the present time scarcely form an article of export. This is truly surprising, when it is considered that the plants generally thrive and produce well, and that there are many localities in Malabar especially suited both in climate and soil for their production in the greatest perfection.

16. The trees indigenous to other countries similarly situated and enjoying a similar climate to that of Malabar, are very numerous and important. The following are well worth introducing, inasmuch as they form numerous and important articles of export from their Native country, or countries where they have been introduced and cultivated, and doubtless would do so here, namely :—

Swietenia Mahagoni, or mahogany of South America; seeds of this tree can be had at the Calcutta Botanic Garden.

Hæmatoxylon campeachianum, or log-wood of South America.

Nectandra Rodiœi, or the green heartwood of Demerara. This tree attains a great size, and is a very valuable timber. It belongs to the natural order *Lauraceæ*, the bark is a much prized febrifuge.

Nectandra Puchury, or Picharim beans of commerce, the seed leaves *(Cotyledons)* are used, and have the flavour of inferior nutmegs.

Aerodiclidium camara, the camara or Ackawai nutmeg of commerce.

Agathophyllum aromaticum, or clove nutmeg of Madagascar.

Ceyptocarya moschata, or Brazil nutmeg.

Camphora officinarum, or China camphor tree.

Dryobalanops camphora, produces the hard camphor of Borneo and Sumatra, which is obtained in a concrete state from cavities in the heart of the tree.

Stagmaria verniciflua, yields the Japan lacquer, a black hard varnish; it is obtained from the trunk of the tree in the same way as dammer.

Balsamodendron myrrha, or myrrh; this plant is called "Kirroobeta" by the natives of Abyssinia, where it grows on the sea coast.

Pentadesma butyracea, or tallow tree of Sierra Leone, the tallow is produced by the juice of the fruit.

Caryocar butyrosum, or Souari nut tree, produces the souari nuts of commerce, and yields an oil equal to olive oil.

Siphonia elastica, an euphorbiaceous plant of Brazil, it yields the bottle Indian rubber.

The Cascarilla of the West Indies is the bark of *Cicca eleuteria*, and is very common in the island of Eleuthera.

Elæis guineensis and *Elæis Melanococca*, yields the palm oil of commerce; the oil is obtained from the nut.

Ceroxylon andicolæ, or wax palm—the trunk of this tree is covered with wax, which exudes from the spaces between the leaves.

Arenga (saguerus) saccharifera. The most valuable palm of Malacca. It yields abundance of toddy, and annually from 6 to 8 lbs. of a strong black fibre, manufactured into cables and ropes of various kinds in the Straits. This fibre has of late years been sent to England, where it is much prized, and brings a high price under the name of "Vegetable bristles": the Malays call the fibre "Ejoo."—In addition to the above fibres, this useful tree produces at the base of the leaves a fine wool-like material called "Barree", and is exported to England in considerable quantities. The trunk of the tree when cut gives upwards of 150 lbs. of sago; the fruit of this otherwise useful tree is of no known use.

Franciscea uniflora, produces the "Mercurio vegetal" of the Portuguese; it is valuable for exciting the lymphatic system, the inner bark and herbaceous parts are only used.

Cinchona micrantha, and other species of Cinchona, which produces the Peruvian bark from the hills in Peru, where it grows at elevations from 3,000 to 5,000 feet. This plant might be successfully cultivated on the Ghauts. The importance of the introduction of the cinchona to India has lately been brought to the notice of the British public by Dr. Anderson.

Cephalis ipecacuanha, or true ipecacuanha from Brazil, where it grows in damp shady jungles; it is a small creeping rooted herbaceous plant.

Solanum pseudoquina, or the "quina" of Brazil, an ordinary sized shrub, which is much used as, and said to be in cases of fever as efficient as Peruvian bark.

Bertholletia excelsa, a large tree which yields the Brazil nuts of commerce.

Eugenia cauliflora, or "Jaboticaburas" of Brazil, is a very valuable fruit tree, and well worth introducing.

Theobroma cacoa, or chocolate shrub, introduced to India about ten years ago, and now to be met with in several parts of the country in a very thriving state; I have not however seen any plants in Malabar, although the climate on the higher elevations, such as Wynaad, is well suited to its growth; seeds could be obtained from E. B. Thomas, Esq., Collector of Coimbatore, who has several very fine plants producing fruit in his garden below Coonoor.

Isonandra gutta, or gutta percha, from the Straits of Malacca, is a plant likely to succeed well in many parts of Malabar, it is of rapid growth and easily cultivated. Two species of this genus occur on the Koondah Ghauts, but neither of them yield gutta percha—the substance discovered by A. Lascelles, Esq., in the Nelambore jungle, is not gutta percha, but a similar gum, which may prove of some value.

17. Should the introduction of valuable plants be seriously thought of being put into execution, considerable difficulties may be expected to be met with in the early stages. The means of transport from one part of the world to another, is now so rapid as to lessen the chances of plants dying on the way; however, the collecting of the plants and procuring the true species will be attended with some difficulty; as also the choosing of a proper site, and applying proper culture to the various species when once introduced; this, in fact is the most important point, as on this depends success or failure, much more than on climate or soil, moreover the failure of the first attempts from the want of skill in the management

of the plants, does a deal of harm, inasmuch as it discourages future attempts to the introduction of plants, which under proper management might have proved of the utmost importance to the country.

18. The plants from the Brazils which form the largest item of the foregoing catalogue, can be obtained from Messrs. Rangel and Moser, Rio Janeiro, communication to these gentlemen to be addressed under cover to the agent for H. M. Packets.

19. *The time of cutting the trees used in the Arts.*—With reference to this question, I beg to observe that generally throughout the districts no particular time is adopted; but the natives prefer cutting the timber, bamboos, &c. for their own use, at the wane of the moon. Much benefit might be derived by felling timber at the proper season. Deciduous trees should be cut as soon after the fall of the leaf as possible; but on no account at the time of budding or expanding of the young leaves. With evergreen trees, the dry season appears the most desirable time for felling them, or at the time the leaves fall off the deciduous trees. The wane of the moon might also be observed in acting according to the season, (as is the current native idea,) for felling with advantage. It has been demonstrated beyond a doubt by the experiments of Zantedeschi, and others, (*Comptes Rendues*, October, 1852,) that the moon exercises considerable influence, physical, chemical, and physiological, on vegetation.

20. *The products of trees, wax, gums, kino varnish, dammer, &c.*—Many of the trees in the Malabar forests produce these in abundance. The most valuable tree under this head is probably the *Vateria Indica,* which is plentiful throughout Malabar, and is called by the natives Piney marum. From the trunk of this tree a valuable gum is obtained in large quantities, called by the Europeans generally "coast varnish". In England it is named in commercial lists *gum animi,* and is the

most valuable gum of Malabar. It forms a large proportion of the best copal varnish, and is used for many other purposes, but never made into candles, (as stated by some writers.) A wax or vegetable fat is also obtained from the fruit or nut of this valuable tree; this is quite a distinct substance from the gum which is got from the trunk. The wax fruit thus obtained is manufactured in large quantities into candles, which are exported to a profitable extent to other districts, and occasionally to England, where they are much prized for the agreeable odour they diffuse in burning. The crude piney gum however forms the most important article of export produced by this tree, the gum being preferred in Europe in its natural state. Dammer and wood oil, both valuable, are also produced by trees belonging to this order, but as every particular regarding these has already been published* I pass over them without remark. None of these valuable trees are cultivated; they are solely the natural products of the forest, and yield a spontaneous supply of gum, &c.

21. Next to the *Vateria* or piney as a gum-producing tree, frequent in Malabar, is the *Pterocarpus marsupium* which yields the gum-kino. This gum is collected in the Malabar jungles, and has been for many years exported from Calicut by Messrs. Kennedy and Co. This tree also abounds in Mysore and Coimbatore. In the latter Collectorate the gum is superior to that generally obtained in Malabar, probably owing to the drier climate. This tree is called *vanghy* by the natives both of Malabar and Coimbatore.

22. A few other gums are produced by trees in the Malabar jungles, but so far as is known of their qualities, they are unimportant. An inferior kind of gamboge is produced by one or two species of *Garcinia*, also a gum commonly sold as gum arabic, but much inferior to that gum.

23. The famous Malabar cardamoms are produced by *Eleutaria cardamona* in its wild state. This plant, so far

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* Dr. Wight's *Illustrations of Indian Botany*: Reedes' *Malabar plants*.

as I can learn, is not cultivated in any part of the district of Malabar. The Ceylon cardamoms are produced by a different species, *Eleutaria major*, and the Bengal cardamoms by *Amomum aromaticum*, hence all the three kinds are the produce of different plants. I have noticed this fact, as it is generally supposed that the superiority of the Malabar cardamoms is due to the soil or climate, whereas it is due to the species of plant producing them.

24. The ginger *(Zingiber officinale)* is very frequent in a wild state in the Malabar district, and is collected in considerable quantities for local consumption and export.

25. Although we frequently hear of ginger plantations, I believe that the ginger, like the cardamom, is not cultivated in the district under consideration. The so-called plantations which I have seen being nothing more than localities partly cleared and cared for where the plant naturally abounds.

26. The cocoanut, the most valuable tree of tropical regions, is cultivated to a great extent in Malabar. The annual produce of cocoanuts in the whole district cannot be less than 700 millions, the lowest value of these may be estimated at 800,000 Rs. or £ 80,000. About 25,000 candies of copra or dried kernels are annually exported, besides oil, jaggery, and coir.

27. *Oils.*—The *Sesamum Indicum* is extensively cultivated for the gingilie oil expressed from its seed. From the seeds of the tree *Poono marum, (Calophyllum inophyllum,)* a good lamp oil is obtained, as also from another, *Schleichera trijuga;* both abundant in Malabar.

28. From the pulp of the fruit of the neem tree *(Azadirachta Indica)* a medicinal bitter oil is expressed. From the seeds of *Flacourtia sapida* an oil is also extracted which is esteemed useful in external applications in cutaneous diseases.

29. A thick oil, something like butter, is expressed from the seeds of *Bassia butyracea.* This oil is used for burning, and in the manufacture of country soap.

30. I have only enumerated a few of the oil producing trees of the Malabar jungles ; I am informed that oil is obtained and manufactured to a greater or less extent from various parts of about twenty-five kinds of trees, and five or six kinds of shrubs. The manufacture of these oils could doubtless be much improved, and thus they might become valuable exports.

31. *Medicinal products.*—I regret that on this head I am unable to give any information, although I have collected specimens of upwards of forty medicinal plants in general use by the Malabar practitioners, with their native names and applications. I have not as yet found leisure to compare and examine them.

32. *Vegetable Dyes.*—The *Arnotta* of commerce is obtained by washing from the seeds of *Bixa orellana*, a tree introduced to Malabar, and now as common about Calicut; but I am not aware of *Arnotta* being manufactured from its seed.

33. The *Morinda tinctoria*, a shrub or small tree, is occasionally used as a red dye; it is very bright, but from its appearance I doubt if it is durable. The root is the part used ; the plant is very common throughout the district, and occasionally cultivated for its dye.

34. The uncultivated species of the famous "madder" is to be found abundantly on the Koondahs, and it is probable a valuable dye may be obtained from its roots, but of this I cannot as yet speak with certainty, not having examined the plant carefully. It however is probably only a variety of the *Rubia cordifolia* which brings a high price in the home market. This *Rubia cordifolia* is a climbing plant, and plentiful in a wild state on that portion of the hills in the Coimbatore Collectorate.

35. From the leaves of *Wrightia tinctoria*, a blue dye is obtained in several parts of the district of Malabar, and is a pretty good substitute for indigo.

36. A very minute tribe of plants called *lichens* (allied to mosses,) are so abundant on the higher ranges of the Koondahs, that they cover almost every rock, old tree, and stone. 'Many of these dye *lichens* are of great value, in fact the most valuable of all known dyes; and I would most respectfully call your attention to them, as in all probability, if thoroughly investigated, and the qualities of the several kinds correctly ascertained, they may in a short time become an important article of export from your district. They are at present entirely unused or unthought of by any of the natives or Europeans.

37. A very carefully written paper has just been published on this subject by Dr. W. L. Lyndley, and read before the Botanical Society of Edinburgh on the 14th of June last. From this paper I take the following extracts, and place specimens of the plant remarked upon, in order to enable you to identify the plants referred to and commented on. The specimens are entire plants.*

38. In this paper Professor Lyndley endeavours to direct public attention to the fact that in our colonies and foreign countries to which we have access, species of *lichens* valuable as dyes probably grow in abundance, and might be collected and transported easily and cheaply, thus they would become

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* 1. *Sticta orygonosee*, gives a beautiful pink dye. Several species of this genus are plentiful on the Koondahs.

2. *Cetaria glauca*. Plentiful on Koondahs.

3. *Parmelia periolata*. Frequent on Koondahs.

4. *Parmelia Nepalense*, yellow dye. Plentiful on Koondahs and about Ootacamund.

5. *Parmelia Borreri*, yields a deep brown dye.

6. *Cetraria Islandica*, used for food and fodder. Iceland specimen nearly allied to specimen found on Koondahs.

7. *Lecanora tartarea*. Common on Koondahs.

8. *Gyrophora Deusta*. Frequent on Koondahs.

9. *Ramalina vulpina*, yields a fine deep yellow dye. Common on Koondahs.

10. *Ramalina farinacea*, used for food. Abundant on Koondahs.

11. *Cladonia rangiferina*. Common on Koondahs.

important and lucrative articles of export. The author is desirous of bringing the subject under the notice of the following classes of persons or scientific bodies, to whom he leaves its practical or scientific application, viz:—firstly, chemists, orchall, cudbear, and litmus manufacturers, importers and exporters of *orchalla* weeds and other dye *lichens*, dyers, &c.; secondly, scientific societies, such as the Royal, Geographical, and Botanical, and the Society of Arts; public boards, such as the East Indian, Army and Admiralty Boards; industrial exhibitions, such as the Sydenham Crystal Palace and Paris exhibitions, scientific and exploring expeditions, &c.; and, thirdly, colonists, emigrants, travellers, officers of our commercial and Royal Navy, and of the Army and East India Company, resident abroad, and in our Highlands and islands, &c. He remarks—" This is pre-eminently an age of discovery and enterprise in scientific matters; the strongest tendency everywhere exhibits itself to multiply the natural resources of our native country and its colonies; to turn to practical account for the improvement of our arts and manufacturers their hitherto valueless vegetable productions. The efforts at present being made to introduce the fibre of the common nettle, thistle, and other native weeds, in the manufacture of textile fabrics and paper, as substitutes for flax, is only one limited example of this utilitarian tendency. Believing that this desire requires only to be led into suitable channels, my object is to submit to scientific and commercial enterprise the importance of this particular field of enquiry, and the richness of the field it promises. The fact that manufacturers or importers might find it economical or remunerative to be supplied with substitutes for the *roccellas*, which are fast becoming scarce and consequently expensive, is the most limited view we can take of the advantages of such an investigation. Indirectly, a multiplied trade in dye *lichens* might scatter the seeds of civilisation, and place the means of a comfortable subsistence at the command of the miserable inhabitants of many a barren island or coast, at present far removed from the great centres of social advancement; for the dye *lichens* will probably be found luxuriant where no other vegetation can thrive, frequently attaining their highest degree of perfection on the most bleak rocky coasts, or on elevated mountain ranges. It is probable that many rocky isles in the broad Pacific and Atlantic, many hundred miles of desolate sea coasts, and vast extents of mountain districts in Africa, America, Asia and Australasia, which at present yield no products to commerce, and are too barren to support higher vegetation, might furnish an unlimited supply of *lichens* useful in dyeing. The vast continent of India and neighbouring countries and islands for instance already promise valuable results in this respect. In the Indian collection of raw vegetable products exhibited in the London Crystal Palace of 1851, several specimens of *orchalla weeds* from India, Ceylon, Socotra, &c., were shown, and an explanatory note appended to some from the vicinity of Aden in Arabia, stated most suggestively,—"Abundant, but unknown as an article of commerce." Specimens of *Rocella fusiformis* were there exhibited from Ceylon, estimated as worth £380 per ton, and *Parmelia perlata* at £190 to £225. But the whole world may be said to be an open field; in every clime, in every soil, at almost every elevation, and in all seasons tinctorial species grow and even luxuriate. In Northern Europe, in Scandinavia, and even in our own Highlands and islands many such species are abundant, and might surely be collected at a rate so cheap as to render it remunerative for the manufacturer to employ our destitute Highlanders in gathering them. Moreover, in connection with the development of the economical applications of *lichens*, it is not unimportant to bear in mind that many species contain such an amount of starchy matter, as to become or to furnish excellent articles of food, many are used as fodder for cattle, some are eaten in Iceland and

Arctic countries, and one at least is frequently used in the making of jellies in this country. I need only here allude, in confirmation of this statement, to the *Cetraria islandica* or Iceland moss of our shops; the *Gyrophora* or "tripe de roche" of the Arctic regions, whereby the lives of many intrepid travellers have been preserved; the *Lecanora esculenta,* a kind of manna peculiar to the steppes of Tartary, and the *Cladonia rangiferina,* or familiar "Reindeer moss" of Lapland. On the mountains of Scotland, Ireland and Wales species of *Lecanora, Gyrophora, Umbilicaria,* and *Isidium,* capable of yielding fine qualities of *orchall, cudbear* and *litmus,* are more or less abundant. While the *cudbear* manufacture flourished in Leith and Glasgow, the *Lecanora tartarea,* from which it was prepared, was collected to a great extent in our Western Highlands and islands, but with the transference of this manufacture into the hands of English orchil makers, this source of remunerative employment to our poor Highlanders suddenly ceased, and this *lichen* is now chiefly or wholly imported from Norway and Sweden for the London market."

39. Thus the dye *lichens,* when thoroughly investigated, may prove most important to India, and in my humble opinion merits the attention of government; inasmuch as it lays open a vast and entirely new field for discovery. The various mountain ranges of the Himalayas, of Bootan, North West Provinces, and the Western Ghats in this Presidency, are localities which cannot fail to yield some valuable species.

40. *Peat Bogs.*—Large tracts of valuable peat bogs occur on the Koondahs, but as these hills are uninhabited, the peat is not used. Similar tracts of peat run as far east as Jackatallah, which forms its eastern limits. There, though it is of inferior quality, it is largely used as fuel. At Ootacamund, being further west, a very superior peat is cut and consumed to a considerable extent. One remarkable

fact connected with these peat bogs is, that the farther west, the better the quality of the peat obtained.

41. I trust you will find this report satisfactory, it is based on minute investigation, and its accuracy may be relied on so far as it goes, much more might have been stated, which requires further confirmation than that at present in my possession, and must be reserved for future consideration and detail.

OOTACAMUND HORTICULTURAL
GARDENS:
21st *November*, 1855.

List of Woods.

	Malabar Names.	*Botanical Names.*
1.	Thadathe Marum.	*Grewia tiliæfolia.*
2.	Thaly Marathoo.	No specimen.
3.	Ben Teak.	*Lagestræmia macrocarpa.*
4.	Irool.	*Mesua* species.
5.	Ven Marathoo, or Poomarathoo.	*Terminalia? Sp.*
6.	Thany Marum.	No specimen.
7.	Chandana Teak.	*Tectonia grandis: Alpine var.*
8.	Stone Teak.	*Tectonia grandis.*
9.	Oodooga Marum.	*Bassia longifolia.*
10.	Poonah Marum.	The three following different species of tree bear this name in Malabar. 1*st. Calophyllum inophyllum.* *2nd. Dillenia pentagyna.* *3rd. Garcinia pedunculata.*
11.	Pathree Marum.	*Pterospermum, sp.*
12.	Vetee Marum, or Black Wood.	*Dalbergia latifolia.*

13. Vangee Marum, or Gum Kino tree.	*Pterocarpus Marsupium.*
14. Jimbagum.	No flowers on the only specimen of this in my collection. From the leaves it appears to be a species of *Symplocos.*

Report of the Committee of Economical Arts, respecting the process invented by M. Fred. Lotteri, *of Bergamo, for the extraction of the silky fibres existing in the bark of the Mulberry Tree.*

[At the general meeting of the Society, held in October 1856, Signor Lotteri, an Italian gentleman recently arrived in Calcutta, submitted several beautiful specimens of a silky substance, prepared by a process invented by him, from the bark of the mulberry tree of Europe *(Morus nigra et alba)*; also specimens of pulp, suitable for manufacturing into paper of the finest quality. On the same occasion he laid before the Society a copy of the Annals of the Universal Society for the Encouragement of Arts and Industry for September, 1855, containing a report on his invention by a special committee of that Society. Under the impression that this report will prove new and interesting to Indian readers, the following translation of it is published in the pages of this Journal.]

We are indebted to the zeal of our honorable colleague, M. Gerolamo Tessi, Consul-General of Portugal and Brazil at Malta, for a communication regarding the process invented by M. Frederic Lotteri, of Bergamo, for the extraction of the silky fibres existing in the bark of the mulberry tree.

This invention, of which you have immediately appreciated the importance, and which you have submitted for examination to your Committee of Economical Arts, has been the object of deep study on its part; and we present you the result of the trials we have made, and the statistical researches we have followed up, to ascertain with certainty the facts advanced by the inventor.

As the principal aim of this discovery is to furnish a new raw material for the manufacture of paper, we had previously examined the state of this branch of industry, and ascertained that the manufacture does increase with an unheard of rapidity, and that in proportion to its increase, so the sources from which we have been in the habit of drawing on, and gathering the raw materials chiefly necessary for this trade, are daily diminishing and drying up.

The first fact, that of the increase of the manufacture of paper is undoubted; we find proof of it in the most authentic statistical documents; these documents prove that in 1842, English manufactories produced 96 millions of pounds of paper; that in 1853 they had attained to the amount of 177 millions, and that in the current year (1855) they will exceed 200 millions. In the United States there are now in existence 750 manufactories in the course of work, having 3,000 machines, and producing 270 millions of pounds of paper. In France we reckon 200 grand manufactories preparing nearly 3 millions of reams, and giving employment to upwards of 15,000 persons. France, which makes every day 400 kilomètres* of paper, scarcely produces enough for its own consumption. It is also in equally enormous quantities that we should reckon the manufactories of Belgium, Germany, Austria, Prussia, Spain, &c.

Nevertheless, several reasons, of which we cannot calculate the effects, tend incessantly to lessen the supplies of the raw material for paper, and, in consequence, to enhance the price. The most important of all is the cheap price of cotton stuffs. It is from the country that the trade used to derive *linen rags* in a greater degree. At the present time the low price of cotton goods has popularized its use among the country people; the supplies which they furnish are diminishing without our obtaining any thing like a substitute. The trains require large quantities of pieces of linen for greasing the naves of the wheels; lastly, the war, at the same time that it deprives us of hemp and flax which come to us from the North of Europe, absorbs for conversion into lint all the better kind of old rags from unserviceable linen and cloth: there is therefore a cause for the high price of rags; it has been in the current year from 30 to 40 per cent., and there is no hope of its speedily diminishing.

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* A kilomètre is about 1093½ English yards.

The Report on the second visit of His Imperial Highness the Prince Napoleon to the products of the tenth class of the Universal Exposition thus expresses itself:—

"Flax, hemp, cotton, do not any longer meet our wants; all textile plants, straw, and even reeds are equally employed; and were it not for the scientific and munificent labours of that powerful body, the East India Company, which has explored its immense possessions to discover all the proper materials for the manufacture of paper, our supply would have been exhausted."

Thus, according to the active march of civilization, amelioration, and progress, introduced into every day life by the force of circumstances, which admit of no exception, the most important, perhaps, of all the Arts, since it is the lever for thought and intellectual work, is brought into imminent danger. It is exactly under the circumstances which alarmed France, without discouraging her, when, at the commencement of this century, the continental blockade compelled her to supply herself, and relinquish products of primary importance which she had obtained from foreigners.

We are at a period in which, from the incessant demands of civilisation, science, after practical researches, responds in the most complete manner without being scarcely ever at fault. It is a kind of emulation, whilst, on the one hand in improving social life, it creates new acquirements and strives to make us enjoy them generally, on the other hand, with inexhaustible resources, it extricates society from embarrassment, and fills vacant spaces, without relaxing in its progress.

Science, accomplishing her providential mission, has already lessened the evil with which we are menaced. A number of textile materials brought to notice by the learned, the Alpha, the dwarf palm, the plantain, the brier, the nettle, straw, &c., are put into requisition. Independently of numerous manufactories converting these materials into paper, a rich English Society, under the name of the Fibre Company, works them on a grand scale.

It is, nevertheless, a fact that all these materials are unfit for the manufacture of paper of a superior or even of a middling quality. We can only regard them as substitutes, but they cannot advantageously replace rags.

The facts which we are now about to set forth are incontrovertible; it is certainly true that the material for manufacturing paper is generally failing, that there is a considerable deficiency, and that as yet we are unacquainted with any material which, by its abundance, its quality, and its low price, combines all the conditions which are united in so complete a manner in rags.

M. Frederic Lotteri presents us his invention as about to stop, as if by magic, this general, and, unfortunately, too certain want of material.

The notes, memoirs and samples submitted by M. Lotteri to the meeting of the Society, have enabled us to verify all his assertions, and we consider it a duty to a cause of importance, and to the reality of this discovery, to present you with a complete analysis of it.

Process of Manufacture.

M. Lotteri, who has been engaged for a long time in the rearing of silk, has proved that the mulberry tree, the leaves of which serve as food for the worms, contains in its bark silky fibres, suitable for the manufacture of paper. Following up his observations, he has noticed that without even touching the trunk of the mulberry tree, we can extract profit from the branches which, every two years, they are in the habit of cutting in the countries where the rearing of silk is carried on. The experiments made by M. Lotteri, and repeated by professors of chemistry, and by persons engaged in the art, have produced excellent success, and it is ascertained, that we can, by simple and inexpensive processes, extract these silky filaments, and make them serviceable for the trade in common with rags.

These branches of the mulberry tree are used at present for the purpose of fuel. M. Lotteri would not prevent their being thus used, as he only removes the bark, that is to say about one-fourth of their substance. Consequently, he does not cause any injury to householders or mechanics, who can always use the woody part for ovens and other fire-places; moreover, the deduction of this quarter portion is fully balanced by the three-fold price, which is returned to the landholder, and by a new branch of industry to the working class.

The barking of the branches of the mulberry is a most simple matter, children, women, and even men, whose weakness prevents more severe labor, may be employed. When the branches and the shoots are cut from the trunk, and during several days after that operation, the bark adheres but imperfectly to the wood, a viscid sap forms between, and admits of its being taken off with the least trouble. Afterwards, by the drying up of the vegetable tissues, the work is not so easy, the produce diminishes in proportion, and the economy of the operation would be destroyed by the expenses entailed by the difficulty of barking.

The mulberry bark, according to M. Lotteri's method, is cleared in less than one day from all extraneous matter, and is afterwards transformed into silk, which, in its turn, can be converted into pulp, suitable for the manufacture of paper of the best quality. This process is, altogether, very inexpensive, as we proceed to explain, and which will be shewn further on, by the account of the charges of manufacture.

Low price of Mulberry bark silk.

As we have shewn that the cultivators, who up to the present time have drawn only one profit from the culture of the mulberry tree, that of the sale of leaves, can derive a new one without injury to the first, in selling the dried bark from the little branches obtained by pruning. One can easily understand that no other textile material can compete, from its low price, with that which is offered for use by the process of M. Lotteri. For the former, ground is required which cannot be used for any thing else, and the cost price of these products consists of the interest on the value of the land, added to the charges for sowing, cultivating and harvesting. For the bark silk we need only take into account the charges of gathering, since another branch of industry already pays handsomely the interest of capital and the expenses of planting and cultivating.

We proceed to analyse briefly the cost price of the mulberry bark silk.

This price is composed of two elements; the first comprises the costs for the supplies of the dried bark; the second those for its transformation into silk.

The supplies of the bark will be regulated according to the rate which the owners charge for peeling it off the branches; they must either bear the expenses of carriage of the dried bark to the factories, or else it must be bought at their own depôts.

Either in one or the other case, in accordance with the calculations which we shall present hereafter, the price may be reasonably settled at 10 centimes the kilogramme* delivered at the factory.

As to the preparation of the silk it is extremely simple. It only requires continual heating, and the use of a chemical product, which is excessively abundant and very cheap. Four labourers and an overseer can easily prepare five to six thousand kilogrammes of silk daily: the workmanship and the charges are scarcely increased.

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* A kilogramme is about 2lb. 3¼ ozs. avoirdupois.

The after calculations will fully prove that the total cost price of silk from mulberry bark, will not, at the most, exceed 20 centimes the kilogramme.

Rags of good quality actually cost 80 centimes the kilogramme, and the middling price is from 60 to 65 centimes.

It is easy to judge, after this, of the advantages which are offered, in an economical point of view, for the carrying out of an art which costs only 20 centimes to manufacture an article at the least as good as rags, which, at the least, cost 65, and the use of which diminishes in so marked a manner the expenses of manufacturing paper.

Abundance of production.

The mulberry tree is cultivated throughout the South and East of France, in Spain, Piedmont, Tuscany, in the Kingdom of Venetian Lombardy, the States of the Church, the two Sicilies, Hungary, Turkey, Asia and America.

In all these countries the culture forms an important branch of territorial industry. We may calculate that the number of mulberry plants in Europe is, at least, 350 millions.

The mulberry being planted five metres* from one to the other, a square kilometre contains about 40,000 plants. The above assumed figure allows then that the culture of the mulberry in Europe occupies a superficies of 8,750 square kilometres, this figure is, most probably, below the mark.

After trial we can assert:—

1st, That the pruning of a mulberry tree gives at least 4 kilogrammes of branches.

2nd, That the bark weighs about a quarter of the branch, and consequently that four kilogrammes of branches will furnish one kilogramme of bark.

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* A metre is about 3 feet 3¼ inches.

3rd, That the bark loses one-fourth of its weight by drying; therefore the kilogramme of bark will be reduced to 750* grammes of dried bark.

4th, That the quantity of silk obtained from the dried bark is about four-fifths, or about 600 grammes.

Therefore every tree will give 600 grammes of silk, and the 350 millions will furnish 200 millions of kilogrammes; and as the pruning takes place every two years, the probable production of silk from the mulberry tree will be 105 millions; but we may, nevertheless, reduce it about a half, and the probable calculation may be, say, 60 millions.

The manufacture of paper in Europe has been raised to a figure of at least 400 millions of kilogrammes; that of America is almost 200 millions; assuming that the discovery of M. Lotteri yields 60 millions of kilogrammes annually for general consumption, we then grant that it alone forms one-tenth per cent of this consumption of manufactured products.

Of the quality of the Silk from Mulberry Bark.

The silk contained in mulberry bark is very fine, and the fibres can be obtained of the same length as the branches. This silk is strong and perfectly white. It can be used for manufacturing paper of the finest quality. As it is produced in a very divided state, and since it does not contain any extraneous matter, it has, under these two conditions, a great advantage over rags, which are obliged to be subjected to a powerful trituration to destroy the web and clear off the impure portions. In this operation rags sustain, according to the data of French manufacturers, a loss of from 25 to 30 per cent.

In America it requires a pound and half of rags to make a pound of paper. The mulberry bark silk in the condition in which the Company take it for consumption, is similar to the white pulp of paper. The manufacturers of paper will therefore have an advantage for employing it in preference to all other material, because the loss will be insignificant, and because the use of it will lessen, in a notable degree, the expenses of manufacture and bleaching.

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* A gramme is about 15 grains.

We believe we are able to sum up this, in saying that, with an equalized price in the market, the mulberry bark silk offers again an advantage over rags of at least about 35 per cent.

It is, nevertheless, important to remark, that the textile materials of which we have spoken above, cannot enter into competition with mulberry bark silk. To obtain these materials it is necessary to provide for the cultivation of the plants which produce them, and consequently to devote expressly the capital of soil, seed, culture and gathering. The value of the produce must cover the interest on the capital, and cannot fail to be very high. It is on this account that so little attention is paid to their developement.

It then appears to us settled, gentlemen, that the discovery of M. Lotteri gives rise to a branch of industry which presents the most favorable conditions, and which may be thus recapitulated :—

1*st*, The manufacture of at least 60 millions of kilogrammes annually, the possibility of increasing that manufacture annually to 100 millions of kilogrammes.

2*nd*, The superior quality of the article produced. and of which we submit specimens in the various states through which it passes in the course of manufacture.

3*rd*, The cheap price, or rather low price of the merchantable article, since the maximum of cost price is about 20 centimes, whilst rags with which this article comes into competition, attains the maximum price of 80 centimes, and keeps always the mean price of 60 to 65 centimes,

We would here close the consideration of this matter if we were not anxious to prove to you,—in submitting the calculations entered into by M. Lotteri, with respect to the expenses of manufacture,—how much pains he has taken in his calculations, with the view of avoiding the mistakes which seem inseparable from all great industrial undertakings.

We can employ, for barking the branches, women, children, and old men; each of them can easily furnish daily 50 kilogrammes of bark. Let us suppose in the calculation, that one prepares 30 kilogrammes that allows:—

	kilog.
100 workmen to prepare, ...	3,000
Which will lose by dessication about ¼ ..	750
There will remain, ..	2,250

Which will cost, delivered in the factory say	francs.	cents.
100 workmen @ one franc a day, ..	100	0
Profit for the proprietor 50 per cent, ..	50	0
Carriage at the rate of 3 fr. for 100 kil. to a distance of 100 kilometres, ..	67	50
Total, ...	217	50

That is to say, 9 centimes and 2-3rds for the kilogramme of bark carried to the factory, say 10 centimes.

The charges of every factory may be estimated approximately in the following manner:—

	francs.
Location or interest of capital for the establishment, ...	1,200
Director (living on the establishment,) ..	2,000
Overseer, ...	1,500
4 workmen @ 2 francs per day, ...	2,400
Purchase of 1,500,000 kilog. of bark @ 10 centimes, ...	150,000
Firewood, ...	6,000
Chemical products, ...	1,300
Carried over, ...	164,400

Brought forward, ...	1,64,400
Office expences, ...	600
Interest on the material, ...	1,000
Contingent expences, ...	9,000
Total, ...	175,000

Therefore, the total of annual expences of a factory will be about 175,000 francs. And in allowing a probable loss of 1-5th for the transformation of the bark into silk, this factory will furnish 1,200,000 kilogrammes of silk annually.

This quantity of 1,500,000 kilogrammes of bark to be supplied for each establishment, is altogether within the limits of possibility. We have proved above, that each mulberry tree would furnish 750 grammes of dried bark; therefore to supply 1,500,000 kilogrammes of bark would require 2 millions of trees; the trees being planted about 5 metres one from the other, each of them occupies a superficies of 25 square metres; and the 2 will occupy 50 millions of square metres, or 50 square kilometres; and in assuming that the mulberry trees are only reckoned at 1-50th in the general culture of the country, where the establishments will be situated, we see that each of them will spread over a superficies of 2,500 square kilometres, or, which is the same thing, will be found at the centre of a circle, the radius of which will be 30 kilometres. We have assumed in our calculations a mean radius of 100 kilometres. It is easy to judge how many the probabilities are, after that, above all chances of error.

The principal expenses of this undertaking being those for the carriage of the bark, and those for the preparation of the silk being comparatively very moderate, the interest of this art requires that establishments should be multiplied as much as possible. This condition accords with the nature of the undertaking, which should count the number of its factories by that of the countries where the mulberry is cultivated;

and which ought, indeed, to have several factories in the same country.

Be this as it may, it appears well established that 1,200,000 kilogrammes of silk can be prepared for the sum of 1,75,000 francs, that is reckoning 15 centimes the price of the kilogramme taken to the factory.

This price ought to be reckoned at 20 centimes, in order to allow a margin for general expences, and for all the unfavorable chances which this work may meet, and which it seems difficult to foresee.

We do not entertain any doubt, gentlemen, as to the accuracy of these calculations, and we need not insist on the importance of this discovery, and on the advantage which will result from it to industry and commerce. It suffices to mention again in this place that paper is at the present day an article of primary necessity in social life, and that M. Lotteri, in affording the means of satisfying that necessity, has solved a problem which prolonged and learned researches have been unable to effect.

Therefore, gentlemen, we ask you to grant, as a proof of recompense and encouragement, a medal of honor to M. F. Lotteri, for his discovery of the preparation of silk from the bark of the mulberry. Moreover, taking into consideration, the usefulness of this discovery, we beg you to exercise the patronage of the Universal Society, in assisting M. Lotteri with your great influence, and in drawing on his invention the attention and interest of Members of the Society.

Resolved, on the motion of the Committee of Economic Arts, whose report is adopted by the Council, that a medal of honor be forwarded, as a proof of recompense and encouragement, to M. Professor Fredk. Lotteri, of Bergamo, for his discovery of silk in the bark of the mulberry tree.

(Translated from the *Annals of the Universal Society for the Encouragement of Arts and Industry*; for September, 1855.)

The Gardener's Note Book,—No. 1.

[Under the above head it is proposed to continue the publication, in future numbers of the Journal, of practical hints communicated by Correspondents of the Society, and by the Society's Head Gardener, on the treatment of useful and ornamental plants.]

Treatment of Amherstia Nobilis: *By* Mr. JOHN McMURRAY, *Head-Gardener of the Society.*

It is evident from the scanty number of trees of *Amherstia nobilis* to be met with about Calcutta, and the sickly naked state of such as one may happen to come across, that the *mallis* and amateurs generally do not understand the proper treatment of the plant.

In all cases the difficulty must arise from an improper selection of the situation and aspect to grow the plant in: also the want of a proper compost, and the quantity, and time of the year to give and refrain from watering. Under these impressions, the following few remarks are introduced in the Journal, as a guide to the members in general, but more especially to those who have already received, and will receive, to the extent of fifty of these plants from the garden this season.

Selecting the situation and aspect for planting out the tree is then first to be taken into consideration. The ground should be open above, and on each side for at least thirty feet, and not any lower than the adjoining ground; strong draughts through gateways and between buildings should also be carefully avoided, and the tree should be well sheltered from the north, north-east and west winds. This may be accomplished by choosing a site close to already established trees, and by planting under shrubs, if the trees be bare of branches below or near the ground.

The situation having been selected, the trench should be marked off twelve feet in diameter, and the soil should be taken out to the depth of two feet. While doing so the top turf should be placed on one side of the hole, and the bottom soil on the other; then obtain a quantity of lime, rubbish, brick-bats, or other such material, and place six inches of that over the whole bottom; after this has been well levelled and slightly beaten down, take the turf that was formerly removed, and spread it evenly over the whole with the grassy side underneath, to keep the loose soil from mixing with the drainage.

The compost should be composed of one third leaf mould, in a decomposed state, one sixth lime rubbish, or bricks broken to gravel, and one fourth well decayed cow manure, the whole to be mixed with one-third of the soil that was previously removed from the bottom of the trench. When this is done, fill up the whole, and see that the mound is raised at least two feet above the level of the adjoining ground, which may be left in that state to settle down for ten days before setting out the plant.

Planting too deep is another most common practice and prevalent error in this country, to give the tree as it is supposed stability, without taking into consideration that the stem, the branches, and the leaves, have each a distinct function to perform.

On this head I would recommend all gentlemen who take an interest in their valuable trees, (I suppose there are few who do not) to look to the planting, and see that the plant is not set deeper than from two to three inches below the ball of earth in which the plant was grown while in the pot. The state in which the plant is in, previous to turning out of the pot, should also be attended to, as the *mallee* will take it out and plant it in the ground, let the ball of earth be ever so dry, and this without taking into consideration that the water essential to be given to recently planted plants, will two out of the three seasons of the year in this country, pass over the hard dry ball without doing the plant any good, but in fact injure, as the sun will cake and crack the new soil round the hard dry lump, and the air will follow and kill the roots.

At the time of planting, a good supply of water should be given to settle the soil about the roots, and attention afterwards will have to be paid to see that the ground does not crack to admit air; when such is the case, which is likely to happen, the soil should be pointed up two or three inches deep. At this season, (September) and during the next three months, the plants will require very little, if any, water; but in the spring, and during the hot weather, a liberal supply should be given once or twice a week which ought to be occasionally substituted for a good dose of liquid manure.

Treatment of Vanilla planifolia and aromatica: By Mr. McMurray.

The *Vanilla* is another useful plant, but much neglected in India, and this seems the more strange, from the readiness the plant can be increased by cuttings, and grown, when planted in its natural situation, and with proper material. The value of the fruit* alone produced by this plant ought to encourage a greater exertion and number of cultivators in this country; and the very habit of the growth of the plant in throwing out roots at every joint in the open air, should be sufficient to suggest to the unpractical eye that the plant should be grown in a shaded situation, and that the material necessary to ensure a healthy growth ought to be open and free to allow the water at certain seasons to pass off freely from the roots, and admit a certain portion of air, and that it should, from its creeping habit, have the rough bark of a tree, jaffery work, or wall, to which to attach its long roots.

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* Mr. McMurray has recently (Dec. 1856) submitted a quantity of exceedingly well formed pods, which have been sent to the Society of Arts. Those raised last year, though not equal in size and flavor to the produce of this season, were favorably reported on by the confectioners of Calcutta.

The situation, as has already been stated, should be well shaded from the sun, and the material in which the whole of this variety of plant thrives best in, is a mixture of lime rubbish and brick bats, or other such material, with one-fourth half decayed leaf mould; the whole should be well mixed together, before placing it round the trunk of the tree or other situation chosen to cultivate the plant. The bed should be made three feet wide on the surface of the ground at the north-east side of the butt of the tree, and it should be raised two feet high. A quantity of the largest lumps of the material should be placed at the bottom, to ensure a good drainage, and the plants should be watered immediately after planting, to settle their roots in the new situation.

The stems of the plant should also be fastened up to the tree, so as to encourage the roots to take hold and cling to the substance against which it is intended to grow: after this the plant will merely require a good drenching with water once a week only during the hot weather, to ensure a healthy growth.

Pruning and manuring the Rose plant: By Mr. McMurray.

It is a difficult matter to lay down any rules for pruning rose trees judiciously in this country, from the confused state in which the names of every group of roses are in at the present time, and as many roses of the same group require very different treatment to bring the flowers to full perfection, it is the more desirable that we should know not only the names, but the character of each plant we are about to operate on. Under such circumstances, the best guide that I can offer is, perhaps, a reference to a few of the more common old and recently introduced roses under cultivation in the Society's garden.

Among these stands first the favorite old Bourbon *Rosa Edwardsia,* which is a robust grower and free trusser at almost every season of the year, but more especially during the cold season, when very frequently great disappointment is caused by the flower buds damping off before coming to full maturity.

The failure in this case will most probably be found to arise from the season chosen to prune the rose, which should be performed about the beginning of June, in order to encourage a vigorous growth during the rainy season, which will produce a sufficient supply of fully expanded flowers during that time. The branches of the previous year's growth should at that time be cut down to within from four to eight inches of the old wood, according to the strength of the branches, and again about the first of November the whole of the plants should be gone over, but at this time merely to shortening in the shoots produced during the rains, by which means we encourage at this time the growth of numerous side branches on the rainy season shoots, which will produce but very few flower buds in a cluster, the majority of which will come to full maturity. All other roses of the same habit as the foregoing should be treated in like manner.

Dissimilar in every respect to the above is the *Rosa canina Bourbonica,* which is of a bushy habit, and in growth throws out many small and a few large shoots, which again sends out branches: it is from these branches that we get the best and largest flowers. The best method to prune this description of rose, is to cut out all the old and decayed branches in November; and again in February, after the first rush of bloom has been produced, go over the plants, and thin out small and useless wood, by which there will be a second healthy growth and production of flowers throughout March.

The whole of the group of *Noisette* roses should be freely thinned out about the first of November, the shoots of any shoots that are left for flowering, should be sparingly cut in, as it is the side branches produced on these shoots that yield the best flowers; and as respects the group of China roses, there is little fear of pruning them out of season; early or late they are sure to flower freely, but, to enlarge the flower, head in the plants close, and as the buds break, pinch out any that may be inclined to grow into the heart of the bush, or otherwise choke the young shoot intended for flowering.

Then there is the group of hybrid Chinese, such as *Lawrence de Montmorency*, *Peeliana** and *Boothiana*,† which require to be well thinned of all small and useless wood, and the young shoots that are left for flowering shortened but little; at the same time on these shoots will be found many small branches, which will have to be cut back to one or two eyes, otherwise they are sure to carry off the sap and rot the flowering shoots.

Of the group of tea-scented roses we have not got many kinds; the most generally known here is the *Victoria odorata* and *Creole maid*, neither of which requires much pruning from the delicate habit of each. The best way to treat these, is to cut away decayed wood in November, and shorten the tips of the shoots, at this time, and when the plants have made a growth, it will be easily seen at that time which of the young shoots are likely to take the lead, of these leave a sufficient number for flowering, and then cut out and clear away as much of the small and useless wood as possible, without disfiguring the plant.

For the foregoing I have generally chosen the first of November for pruning, because insects are guided in hatching according to the seasons; if the rains set in early in the season, the insects come out the sooner, if late they are in the same way later. I am guided by this. Sometimes I do not prune my roses before the end of the first week in November, and at other times I prune in the middle of October; but before I commence this work I always watch the movements of the insects, and so soon as I see one on the bush I then prune and carry the branches at once off the ground. By this the insects and eggs remaining to be hatched are at once destroyed. If the plants are pruned before these caterpillars are hatched, and have made a young growth, so soon as the young grub comes out, it will immediately make to the growing points, and travel from shoot to shoot, and thereby destroy the young buds or flowers.

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* Named after Sir Lawrence Peel, for several years President of the Society, and a Patron of Indian Horticulture and Floriculture, who first sent plants of this fine rose to the Society's garden.

† Named after Mr. George Booth, Nurseryman of Liverpool, from whom the Society first received plants of this rose.

The roots of all kinds are partially striped at the time of pruning, and left in that state for two or three days, then filled in with cow manure; over that, place the soil that was previously shifted, and leave the whole for about ten days: by this time it will be found the plants, if healthy, will have pushed out many shoots. Look over the whole, and see that none of the shoots are growing across each other, and where two come together, pinch one of these out. Remember, a rose plant never can bring to perfection the flowers on the number of branches generally thrown out: what is considered superabundant must be pinched off, and that freely, as it is better to have a dozen of good blossoms than two of indifferent ones. In addition to the manure given to the roots, manure water is given at the rate of five gallons per plant once a week after they have made shoots from two to three inches, this causes a vigorous growth at the proper time, when the plant roots are in full vigour or action.

Raising of Mushrooms: *By* D. B. Lindsay, Esq.

On the floor of an unoccupied bungalow I laid a layer of broken bricks about three inches thick, and covering a space about fifteen feet in length, by about three in breadth. Upon the top of the bricks, I built up a bed of three layers of unbroken horse-droppings, about three inches thick, and three layers of good mould also about three inches thick, say first a layer of horse-droppings, and then a layer of mould, and so on.

The droppings should be partially dried, and well beaten down before being covered with the mould.

Water the bed occasionally, and in two or three months I will guarantee a crop of mushrooms.

I have tried English mushroom spawn placed on the top of the last layer of mushrooms, but I do not think that it has resulted in any thing, for I have two beds, one *with* the spawn and one *without it*, and I have not found any difference between them.

Two descriptions of mushrooms have grown, one such as I sent to you lately with a brownish top; I think it is the common mushroom of the country, and the other which is much the finest and largest of the two, with a pure white top. The gills of both are a light pink or salmon color, when fresh.

I think it would be a decided improvement to have the house which the mushrooms are to be grown in slightly heated, especially during the rains.

Analyses of the mineral constituents of the Flax plant, and of the soils on which the plant had been grown: by Dr. JOHN MAYER.

MY DEAR SIR,—I have much pleasure in forwarding to your address, the paper to which Dr. Royle refers, and only wish that your Society may find any thing in it, deserving their attention, or worthy of the favorable mention made of it by Dr. Royle.

I feel honored by the request to offer any remarks which may appear to be connected with the subject, and although

I can scarcely hope to afford any information, I will in compliance with this request, venture to draw attention to the necessity of examining the soils on which the plants were grown—at the same time that the plants themselves are under examination. The great master of modern chemistry has demonstrated so completely the necessity of ascertaining whether the soil in which any plant may be placed, contains a sufficiency of each constituent required by the plant, and that too in such a form as to permit of its being taken up by the rootlets of the plant, that it would be a mere waste of words to insist on it. Now it may not however be altogether useless to endeavour to keep such leading and guiding facts in view, since it is only by first determining in what particular constituents required by the plant the soil is deficient, that we obtain a knowledge of what it is necessary to supply to the soil, so that the plant may hereafter find in the soil all it requires.

From the above cursory remarks, it will be seen that I allude here only to the inorganic constituents of plants for the proper growth of the organic matters, derived from air and water almost entirely, of course a locality ensuring the requisite amount or degree of moisture, temperature, &c., &c., must be selected. Trusting that I have not extended my remarks to too great a length.

I remain,
Dear Sir,
Yours very truly,
JOHN MAYER.

MADRAS,
July 6, 1856.

Analyses of the mineral constituents of the Flax plant, and of the soils on which the plant had been grown: by J. E. MAYER *and* J. S. BRAZIER, *Esqrs.*

The daily increasing extent to which flax is cultivated by the farmer, necessarily directed the attention of chemists to the analysis of this plant, soon after the importance of the mineral constituents, strangely neglected for a considerable period, had been generally acknowledged by the scientific agriculturist.

We owe to Sir Robert Kane two excellent papers, containing the analyses both of the ashes of different specimens of flax, and of the soils on which they had been cultivated.* These specimens had been grown principally in Belgium and Holland, where the greatest care is taken in preparing and manuring the land. The analyses which we intend to communicate in the following pages, were made with different specimens of Russian growth. They were supplied to us by Dr. Hofmann,† under whose guidance we have worked throughout.

The localities from which we have obtained our specimens of Flax, are the Russian districts known as Esthonia, or Estland, Livonia or Lievland, Courland, and Lithuania. The first of these districts, with the second and third mentioned, are situated on the eastern shores of the Baltic; the fourth, Lithuania, is the only inland country.

These countries extend from 48° to 60° north latitude, and from 22° to 28° east longitude.

The plan we adopted for the preparation of the ash was the following:—A handful of stems, after being inflamed, were held over a porcelain dish, and allowed to burn gently. The ashes collected in the dish by this process, in one or two instances, were remarkably white; however, in order to free them still more from the remaining carbon, they were placed, small quantities at a time, in a platinum dish over a gentle gas flame. In this manner also the sulphides, formed in the process of combustion, were entirely reconverted into sulphates. This conversion was proved by experiment previous to analysis. In order to hasten the latter part of the process, the Lithuanian and Estland ashes were burned with protoxide of mercury.

The general analyses were performed in the usual manner:—the experimental numbers in Table I shew the quantities of substance employed, the results from which are exhibited in Table II.

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* *Philosophical Magazine*, Vol. xxxi, p. 43.

† I am indebted for these specimens to the kindness of Mr. Arthur Marshall, of Leeds, who had them sent from Russia for analysis, being originally intended to supply the material for a continuation of Sir Robert Kane's researches; and it was only in consequence of Sir Robert's other avocations preventing him from following up the investigation any further, that Mr. Marshall sent them to the Laboratory of the Royal College of Chemistry.—Dr. A. W. Hofmann.

TABLE I.

	Lievland.		Courland.		Lithuanian.		Estland.	
	I.	II.	I.	II.	I.	I.	I.	II.
	grm.	grm.	grm.	grm.	grm.	grm.	grm.	grm.
Quantity of ash employed for the general analysis	4·7076	4·6640	5·3100	1·2953	6·1526	5·8256	4·4630	
Whole amount of the hydrochloric acid solution	324·0300	197·5950	293·495	293·495	242·5620	206·9200	280·7400	
Hydrochloric acid solution employed for the alkalies	17·5040	16·8415	24·2960	27·4094	28·8473	28·1370	20·3240	23·9870
Hydrochloric acid solution employed for sulphuric and phosphoric acids	27·8896 29·1392	0·7767	26·6230	27·1031 27·2480	27·4080	28·0232	22·7710 22·6950	23·0280
Hydrochloric acid solution for sesquioxide of iron, lime and magnesia	30·2702	30·7767	31·7940 19·9430 31·7940	21·9975 19·2260 27·5790	28·8495 28·4630	25·4352	28·0500 22·7700	25·8150 19·7130
Quantity of ash employed for the estimation of chlorine	2·0813	1·3249	·8360	....	1·0017	....	1·3159	.. ..
Quantity of ash employed for the estimation of carbonic acid	·5738	·8875	·7023	·8097	·8017	·7480	·9680	·8418
Quantity of the plant dried at 100° C. for the estimation of the amount of ash	6·0140	5·4247	1·4577	....	3·3575	....	2·4930	.. ..

TABLE II.

	Lievland.		Courland.		Lithuanian.		Estland.	
	I.	II.	I.	II.	I.	II.	I.	II.
	grm.	grm.	grm.	grm.	grm.	grm.	grm.	grm.
Silicic acid	0·3098	0·3260	0·3590	0·0868	0·2850	0·2597	0·2010	.. ..
Sand and charcoal	0·3240	0·0128	0·1485	0·0331	0·0750	0·0689	0·1145	.. ..
Mixed chlorides of potassium and sodium ..	2·6678	2·6492	2·8690	2·8736	3·1279	3·1203	2·3332	2·3349
Bichloride of platinum and potassium ..	8·7439	8·6829	8·1660	8·1734	8·8082	8·7819	5·3430	5·3521
Chloride of sodium	.. ..	.. ..	0·3778	0·3797	0·4407	0·4409	0·7030	0·7001
Sulphate of baryta for sulphuric acid ..	0·6369	0·6382	0·7222	0·6692	0·4299	0·5047	0·5424	.. ..
Pyrophosphate of magnesia for phosphoric acid	0·6492	0·6504	0·5512	0·5601	1·0257	1·0394	0·9710	0·9813
Phosphate of sesquioxide of iron	0·1338	0·1333	0·1477	0·1413	0·1513	0·1459	0·1252	0·1301
Carbonate of lime	1·4451	1·4314	1·8998	1·9077	1·9832	1·9955	1·8913	1·8814
Pyrophosphate of magnesia for magnesia ..	0·8028	0·7324	0·9046	0·8801	0·8818	0·9592	1·3006	1·2817
Chloride of silver	0·0409	0·0277	0·0320	.. ..	0·0692	.. ..	0·0487	.. ..
Carbonic acid	0·1500	0·1550	0·1300	0·1500	0·1830	0·1700	0·0750	0·0650
Amount of ash left on incineration ..	0·2532	0·2240	0·0530	.. ..	0·0773	.. ..	0·1020	.. ..

These numbers correspond to the following composition per cent:

I.—LIEVLAND FLAX ASH.

The stems, upon incineration, gave in average 4·1292 per cent of ash.
Composition of the ash directly found:

	I.	II.	MEAN.
Potash	35·0670	34·8588	34·9629
Lime	17·1892	17·1833	17·1862
Magnesia	6·2197	6·3278	6·2738
Sesquioxide of iron ..	0·9235	0·9286	0·9260
Chloride of potassium	1·0849	1·0201	1·0525
Phosphoric acid ..	8·8048	8·8224	8·8136
Sulphuric acid ..	4·5097	4·6012	4·5554
Silicic acid	6·5812	6·9216	65·714
Carbonic acid ..	17·5914	17·4648	17·5281
Sand and charcoal ..	0·6788	0·3425	0·5106
	98·6502	98·4711	98·5605

The above numbers, after deducting sand and charcoal, which are considered but as accidentally present, and also carbonic acid, give the following composition per cent:

Potash	43.42
Lime	21·35
Magnesia	7·79
Sesquioxide of iron	1·15
Chloride of potassium ..	1·31
Phosphoric acid	10·94
Sulphuric acid	5·66
Silicic acid	8·38
	100·00

II.—COURLAND FLAX ASH.

The stems, upon incineration, gave in average 3·6358 per cent of ash.
Composition of the ash directly found:

	I.	II.	MEAN.
Potash	29·6786	29·5988	29·6387
Soda	2·9640	2·9433	2·9536
Lime	20·1184	20·0355	20·0769
Magnesia	6·1111	6·2123	6·1617
Sesquioxide of iron..	0·9038	0·8646	0·8842
Manganese	trace	trace	trace
Chloride of sodium..	1·5562	1·5562	1·5562
Phosphoric acid ..	6·5948	6·7027	6·6487
Sulphuric acid ..	4·6647	4·3220	4·4933
Silicic acid	6·7027	6·7604	6·7316
Carbonic acid ..	18·5106	18·5253	18·5179
Sand and charcoal ..	2·5559	2·7966	2·6762
	100·3608	100·3177	100·3390

Percentage after deducting sand, charcoal and carbonic acid:

Potash	37·44
Soda	3·74
Lime	25·39
Magnesia	7·71
Sesquioxide of iron	1·13
Chloride of sodium	1·94
Phosphoric acid	8·31
Sulphuric acid	5·89
Silicic acid	8·45
	100·00

III.—LITHUANIAN FLAX ASH.

The stems, upon incineration, gave in average 2·3023 per cent of ash.

Composition of the ash directly found:

	I.	II.	MEAN.
Potash	27·5459	27·4770	27·5114
Soda	2·3055	2·3065	2·3060
Lime	18·0526	18·1648	18·1087
Magnesia	5·6794	5·5154	5·5974
Sesquioxide of iron	0·7991	0·7710	0·7850
Chloride of sodium	2·8115	2·8115	2·8115
Phosphoric acid	10·5868	10·8972	10·7420
Sulphuric acid	2·6755	2·8137	2·7446
Silicic acid	4·6346	4·4532	4·5439
Carbonic acid	22·8302	22·7272	22·7787
Sand and charcoal	1·2190	1·1828	1·2009
	99·1401	99·1203	99·1301

Percentage after deducting sand, charcoal and carbonic acid:

Potash	36·61
Soda	3·06
Lime	24·09
Magnesia	7·45
Sesquioxide of iron	1·04
Chloride of sodium	3·75
Phosphoric acid	14·30
Sulphuric acid	3·65
Silicic acid	6·05
	100·00

IV.—ESTLAND FLAX ASH.

The stems, upon incineration, gave in average 4·0914 per cent of ash. Composition of the ash directly found:

	I.	II.	MEAN.
Potash	23·1083	23·0432	23·0757
Soda	7·5111	7·5323	7·5217
Lime	23·8567	23·6070	23·7318
Magnesia	10·6274	10·4718	10·5496
Sesquioxide of iron	0·9115	0·9363	0·9239
Chloride of sodium	1·5069	1·5069	1·5069
Phosphoric acid	13·8098	13·9642	13·8870
Sulphuric acid	4·1678	41·678	4.1678
Silicic acid	4·4815	4·4815	4·4815
Carbonic acid	7·7559	7·7215	7·7387
Sand and charcoal	2·5878	2·5878	2·5878
	100·3247	100·0203	100··1724

Percentage after deducting sand, charcoal and carbonic acid:

Potash	25·70
Soda	8·37
Lime	26·41
Magnesia	11·74
Sesquioxide of iron	1·02
Chloride of sodium	1·67
Phosphoric acid	15·47
Sulphuric acid	4·64
Silicic acid	4·98
	100·00

From the foregoing analyses, the following comparative table has been made, from which it will be readily seen, in what points the ashes of these different specimens agree in composition.

	Lievland.	Courland.	Lithuanian	Estland.
	I.	II.	III.	IV.
Potash	43·42	37·44	36·61	25·70
Soda	..	3·74	3·06	8·37
Lime	21·35	25·39	24·09	26·41
Magnesia	7·79	7·71	7·45	11·74
Sesquioxide of iron	1·15	1·13	1·04	1·02
Manganese	..	trace.	..	..
Chloride of sodium	..	1·94	3·75	1 67
„ potassium	1·31	..	..	..
Phosphoric acid	10·94	8·31	14·30	15·47
Sulphuric acid	5·66	5·89	3·65	4·64
Silicic acid	8·38	8·45	6·05	4·98
	100·00	100·00	100·00	100·00

We also append, in a tabular form, the results of Sir R. Kane's analyses of this plant, taken from his paper, read before the Royal Dublin Society, on the 6th of April, 1847.

To facilitate comparison, we have re-calculated these analyses after deducting the carbonic acid.

	A	B	C	D	E	F	G
	Courtrai District.		Antwerp District.				
	Heestelt.	Escamaffles.	Hammezog.	Not named.	District in Holland.	Dublin.	Armagh.
Potash	9·69	30·62	26·67	28·62	21·35	11·78	6 60
Soda	24·16	none	16·88	0·48	12·65	11·82	6·61
Lime	19·37	22·04	22·15	21·19	21·30	14 85	23·67
Magnesia	4·34	4·45	4·70	4.05	3·50	9·38	4·22
Sesquioxide of iron ..	5 66	2 03	1·31	2 53	2·74	——	14·10
Alumina	0·56	0·58	0·86	——	1·67	7·32	——
Manganese	trace.	trace.	trace.	——	——	——	1·12
Sulphuric acid ..	7·93	8·33	8·18	13·43	11·12	3·19	9·30
Phosphoric acid ..	14·10	15·78	10·66	12·19	12·82	13·05	7·29
Silicic acid	3·85	4·54	3·20	3·36	6·18	25·71	0·94
Chloride of sodium ..	10·34	11·63	5·49	14·15	6·57	2·90	26·15
	100·00	100·00	100·00	100·00	100·00	100·00	100·00

On comparing the results of our analyses with those of Sir Robert Kane, we find at once that the general features of both are identical, although, as might be expected, discrepancies present themselves respecting the individual constituents. In the ashes, both of the Belgian and of the Russian specimens, we meet with a very large amount of alkali (nearly 40 per cent): the quantity, too, of phosphoric acid is very considerable (from 10 to 15 per cent). Our analyses then furnish a further proof that flax must be classed among the most exhausting crops, for the amount of valuable mineral substances which we remove from the soil in this plant considerably exceeds the quantity which is generally extracted from it in the form of wheat or corn.

From a statement of Mr. Mac Adam,* it appears that one rood of land yields about 12·7 cwt. of recently pulled flax plant. If we take this number as the basis of calculation, and the average percentage of ash, at 3·53 this, of alkalies at 39·58 lbs., and of phosphoric acid, at 12·51 lbs, we find that a flax crop removes from a rood of land not less than 12·21 lbs. of alkalies, and 5·94 lbs. of phosphoric acid; on the other hand, we have learnt from the researches of Mr. Way,* that a rood of land, which has served for the cultivation of wheat, loses (an average taken from a great number of analyses) about 7·5 lbs. of alkali, and 6·9 lbs. of phosphoric acid. These figures show that the amount of phosphoric acid in the flax crop closely approaches that of the wheat, whilst the latter extracts only about half the quantity of alkaii which we find in the former. Hence, it would appear, that a flax crop is at least as exhausting as a crop of wheat.

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* *Royal Agricultural Society's Journal*, Vol. VIII, p. 361.

There is, however, one striking point of dissimilarity between the cultivation of wheat and that of flax, and we are indebted to Sir Robert Kane for having for the first time brought this point under the notice of the farmer in a forcible manner—viz: that while the mineral ingredients which we remove from our fields in wheat, or cerialiæ in general, become constituents of food, and enter in this manner into a circulation, from which, even under very favourable circumstances, they return to the soil only after the lapse of some time; the woody fibre of flax, as a necessary preliminary to its being used by man, is separated to a considerable extent from those very mineral substances, which are so essential for its successful growth. This mineral matter, when economized in a proper manner by the farmer, may be returned to his field to keep up the equilibrium of its fertility.

The vegetation of the flax plant resembles in this respect the growth of the sugar-cane, from the culture of which, we expect a material consisting entirely of atmospheric constituents. The inorganic substances taken up by the plant are only instruments used in its production, which should be as carefully preserved as tools in a manufactory, and will then do further duty in promoting the elaboration of future crops.

The analysis of the flax ash suggests a few remarks respecting an interesting feature in the nature of ashes generally, which was first noticed by Professor Liebig in his celebrated Agricultural

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* *Royal Agricultural Society's Journal,* Vol. VII, p. 593.

Chemistry. On comparing the composition of the ashes of specimens of the same plant, cultivated under different circumstances, he observed, that notwithstanding very considerable discrepancies in the constitution, the entire basic power of the different bases united with a certain class of acids, for instance, the organic acids remained constant for different specimens of the same plant: or in other words, the basicity of an oxide being measured by its oxygen, the total amount of oxygen contained in the bases forming organic salts was found to be identical in the different specimens. The views respecting this typical basicity, which Liebig pointed out in a few instances, and only for the salts or organic acids, were afterwards extended by other chemists. Indeed, the total amount of oxygen contained in the form of basic oxides seems to vary only within narrow limits for different individuals of the same class of plants. Sir Robert Kane has calculated the quantity of oxygen in the bases of his flax ashes, the constancy of which certainly seems to support this view; our analyses lead to a similar conclusion, as may be seen from the following figures:

Name of the ash.	Quantity of basic oxygen in 100 parts.	Name of the ash.	Quantity of basic oxygen in 100 parts.
Heestert	16·95	Lievland	16·80
Escamaffles	14·00	Courland	17.89
Hamme Zog	17·71	Lithuanian	17.12
Unknown district ..	13·36	Estland	17·86
Holland	15·83		
Dublin	16·36		*Mean* 17·42
Armagh	15·68		
	Mean 15·68		

The composition of several wheat-ashes, as resulting from Mr. Way's analysis, likewise appears to be favourable to this view.*

Specimen	No. 1.	Hopeton wheat	11·64	per cent.
„	No. 2.	Creeping wheat	11·52	„
„	No. 3.	Red straw white wheat ..	11·02	„
„	No. 4.	Hopeton wheat, No. 2, ..	11·94	„

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* *Royal Agricultural Society's Journal*, Vol. VII. p. 656.

,,	No. 5.	French wheat	12·59	per ce
,,	No. 6.	Egyptian wheat	12·19	,,
,,	No. 7.	Odessa wheat	12·08	,,
,,	No. 8.	Marianople wheat	14·46	,,
,,	No. 9.	Hopeton wheat, No. 3,	12·89	,,
,,	No. 10.	Red straw White wheat	11·53	,,
,,	No. 11.	White wheat	12·24	,,
		Mean	12·19	

The argument, however, drawn from these ashes, is of minor importance, the discrepancies in their composition being far less conspicuous than in the former cases.

The number representing the basic power of the sum of the metallic oxides in the ash varying within trifling limits, it is but a natural consequence that we should likewise find a certain constancy in the acidity of the total amount of acids. Without going into detail, a glance at the tables will shew, indeed, that a replacement of the acids occurs to a certain extent. Whenever the amount of carbonic acid, which represents the organic acids, diminishes, we find the quantity of inorganic acid, as sulphuric and phosphoric, increases, and *vice versâ.*

Our attention was next directed to the soils upon which the different specimens of flax had been grown, samples of which, through the kindness of Mr. Marshall, had likewise been forwarded to Dr. Hofmann.

These soils all gave a brownish colour to boiling water, owing to a portion of the organic matter being soluble in that menstruum.

The following table shews the behaviour of these soils with solvents :

		Lievland	Courland.	Lithuania.	Estland.
Soluble in water	Inorganic matter	0·0864	0·1700	0·1528	0·1497
	Organic matter	0·2290	0·3125	0·4417	0·4578
	Total	0·3154	0·4825	0·5945	0·6075
Soluble in hydrochloric acid		7·2596	6·9166	7·2433	8·7119
Insoluble residue		92·4250	92·6009	92·1622	90·6806
		100·0000	100·0000	100·0000	100·0000

The following tables contain the details of the individual determinations:—

TABLE I.

	Lievland.	Courland.	Lithuanian.	Estland.
	grm.	grm.	grm.	grm.
Quantity of soil employed for general analysis.. .	20·0480	22·3010	18·5560	22 9480
Amount of the hydrochloric solution	270·0400	232·3550	324·1250	263·98
Hydrochloric solution for alkalies	64·1800	67·4600	74·3800	56·1600
Hydrochloric solution for sulphuric acid	58·0350	65·2700	69·9400	45·53
Hydrochloric solution for phosphoric acid, sesquioxide of iron, alumina, lime and magnesia ..	84 3700 73·4400	69·7700	75·9150	88·7600 50·9400
Hydrochloric solution for the sesquioxide of iron ..	23·8400	46·9195	60·7950	22·1800
Quantity of soil for chlorine	13·2600	11·3701	11·6611	14·4190
Quantity of soil for total amount of organic matter	7·5850	4·9130	5·6485	7·3205
Quantity of soil for total amount solution in water	161·8400	205·1700	228·2350	104 6100

TABLE II.

	Lievland.	Courland.	Lithuan.	Estland.
Residue	18·5294	20·7465	17·1003	20·8094
Mixed chlorides of potassium and sodium	0·1684	0·1757	0·1839	0·1738
Bichlorides of platinum and potassium	0·5217	0·3758	0·5255	0·4419
Chloride of sodium	0·0091	0·0609	0·0236	0·0388
Sulphate of baryta for sulphuric acid	0·0999	0·0543	0·0784	0·8897
Pyrophosphate of magnesia for phosphoric acid	0·0448	0·0190	0·0234	0·0577
Sesquioxide of iron and alumina ..	0·6214	0·9477	0·9864	0·9250
Sesquioxide of iron	0·3624	0·5300	0·5911	0·4537
Carbonate of lime	0·1504	0·3113	0·1494	0·3237
Pyrophosphate of magnesia for magnesia	0·1103	0·1075	0·0918	0·2228
Chloride of silver for chlorine ..	0·0150	0·0071	0·0123	0·0280
Amount of soil left after ignition ..	7·2120	4·7150	5·4031	6·9645

From the former tables we obtain, by calculation, the following amounts of constituents of 100 parts in the soils :—

	Lievland.	Courland.	Lithuan.	Estland
Potash	0·5011	0·3241	0·5466	0·3726
Soda	.. ..	0·1320	0·0452	0·0480
Lime	0·3751	0·7816	0.4980	0·7955
Magnesia	0·2006	0·1304	0·1805	0·3619
Alumina	1·1919	1·8731	2·1418	2·0102
Sesquioxide of iron	1·8076	2·3767	3·1900	2·0206
Manganese	trace.	trace.	trace.	trace.
Chloride of sodium	0·0455	0·0247	0·0421	0·0790
Sulphuric acid	0·1539	0·0880	0·1206	0·1618
Phosphoric acid	0·1399	0·0538	0·0805	0·1597
Organic matter	4·7176	4·0300	4·3442	4·8630
Insoluble residue after deducting organic matter	91·0634	89·4872	88·4724	88·2364
	100·1966	99·3016	99·6619	99.1087

The insoluble residue constituting the greater portion of the soil was fused with carbonate of potash. The following are the experimental numbers :—

	Lievland.	Courland	Lithuan.	Estland.
Amount of residue employed ..	0·9790	1·2955	0·8620	0·9780
Amount of hydrochloric acid solution obtained	82·35	213·9450	270·3300	91·9300
Amount of hydrochloric solution for the determination of sesquioxide of iron and alumina ..	17·11	26·9730	29·5835	30·1800
Amount of hydrochloric solution for the determination of lime. ..	..	27·7520	26·0968	26·1700
Amount of silicic acid obtained ..	0·852	1·1353	0·7958	0·8930
Amount of sesquioxide of iron and alumina obtained	0·0260	0·0106	0·0023	0·0210
Amount of carbonate of lime obtained	..	0·0061	0·0015	0·0120

The insoluble residues, upon calculation, yield the following results per cent:—

	Lievland.	Courland.	Lithuania.	Estland.
Lime	traces.	1·8727	0·8778	2·0120
Alumina	11·6270	6·1145	22·452	5·7549
Sesquioxide of iron	traces.	traces	traces.	traces.
Phosphoric acid	traces	traces.	none.	traces.
Silicic acid	79·3424	81·5000	85·0938	80·5676
	90·9694	92·6224	88·2168	88·3345

In all the four soils we find, comparatively speaking, considerable quantities of alkali, especially potash, and also of phosphoric acid. They closely resemble the Belgian soils analysed by Sir Robert Kane, as may be seen from the tables, which we borrow from Sir Robert's paper.

	Heestert.	Escamaffles.	Hamme Zog.	Not named.	Holland.
Potassa	0·160	0·123	0·068	0·151	0·583
Soda	0·298	0·146	0·110	0·206	0·306
Lime	0·357	0·227	0·481	0·366	3·043
Magnesia	0·202	0·153	0·140	0·142	0·105
Alumina	2·102	1·38[illegible]	0·125	0·988	5·626
Sesquioxide of iron	3.298	1·663	1·202	1·543	6·047
Manganese	trace.	trace.	trace	no trace.	trace.
Chloride of sodium	0·017	0·030	0·067	0·009	0·023
Sulphuric acid	0·025	0·017	0·013	0·026	0·023
Phosphoric acid	0·121	0·152	0·064	0·193	0·159
Organic matter not driven off at 100° per cent.	3·123	2·361	4·209	3·672	5·841
Clay	14·920	9·280	5·760	4·400	17·080
Sand	75 080	84·065	86·797	88·385	60·947
	99·703	99·600	99·975	100·081	99 783

In conclusion, we beg to express our warmest thanks to Dr. Hofmann for his instruction and valuable advice during the prosecution of these analyses, and for the uniform kindness we have at all times experienced at his hands.

Report on Cotton raised by Col. Hannay, *in Upper Assam, from acclimated North American seed.*

To the Secretary to the Agricultural and Horticultural Society.

Sir,—With the permission of Government, the Board of Revenue beg to place at the disposal of the Society a bale of cotton grown in Col. Hannay's garden at Debrooghur.

2. I am directed by the same opportunity to annex a copy of the Colonel's letter, dated the 14th May last, transmitting the bale in question, and referring to certain samples of cotton grown by him from foreign* and acclimated seed; and to request that you will inform the Board whether the samples of cotton from Pettigulph seed are suitable for the Europe markets.

Yours, &c.,
E. T. Trevor,
Officiating Secretary.

Fort William:
The 18*th July,* 1856.

To Capt. E. T. Dalton,
Collector of Luckimpore.

Sir,—With reference to former communications on my experimental foreign cotton cultivation at Debrooghur, I have now the honor to state that I have sent you a small bale, containing samples of two kinds of foreign cotton as follows, for transmission to the Revenue Board.

Two samples, Nos. 1 and 2, of Sea Island or black seeded cotton.

Two ditto of Pettigulf cotton or *Kupas.*

One ditto of cotton partially cleaned and picked.

2nd. It may be necessary for me to state that of half a maund of Sea Island cotton seed received by me in 1854, from Government, scarcely any vegetated, sufficiently to give produce, and of the half maund Pettigulf seed received at the same time not a seed vegetated, the seed being bad : the *cotton now forwarded therefore may be considered entirely as the produce from acclimated seed of the former stock.* I have also to notice that although the seed of the Seychelles cotton vegetated well, and produced fine large healthy plants, not a flower or pod was visible for the two seasons I had it under cultivation. The bushes have now died off. The non-productiveness of this cotton I have noticed in my last letter.

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* All the samples received from the Board, are the produce of acclimated seed.—A. H. B.

3rd. Of the quality of the samples now sent, I will not say much ; that of the Sea Island is not I think so good as the produce of the original seed. This however is a most difficult cotton to rear, it being so easily affected by damp or wet weather, which bring the insects into the pods, and destroy its productiveness. The Pettigulf cotton, is much more hardy, and if the samples of this description now forwarded are considered suitable for the European market, I would recommend its cultivation in Upper Assam, all *Assoo* rice lands being suitable for it.

4th. I would take this opportunity of noticing that of the seeds forwarded to me by the A. and H. Society, and presented from Mr. Fortune in China for distribution in Bengal, the Green Indigo, &c., the greater number of the seeds did not vegetate. I found however amongst them, the *Phasar*, a plant common in Nepaul and Bootan, and cultivated as a vegetable,* two species of the Jute producing family, two species of Millet and of the Paddy, they were all of the same kind in use with the people of the plains, and hills of Upper Assam. Of the large tree seeds, but one species vegetated, the tree which produced a seed from which an oil is expressed, used by the carpenters in China; I have not as yet ascertained that the same plant is found in our jungles.

I am, &c.,

DEBROOGHUR : (Sd.) S. F. HANNAY,
The 14*th May*, 1856. *Commanding* 1*st A. L. I.*

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* Also by Khampties and Duanruias of the Suddyah District.

To the MEMBERS OF THE COTTON COMMITTEE.

GENTLEMEN,—I beg leave, by desire of the Society, to submit, for the favor of your opinion, sundry samples of cotton, (as per subjoined particulars,) the produce of Col. Hannay's plantation at Debrooghur, Upper Assam. A communication from the Board of Revenue, with a letter from Col. Hannay, is enclosed. It will be seen that the Board are desirous of ascertaining "whether the samples of cotton from Pettigulf seed are suitable for the Europe markets."

Yours faithfully,

METCALFE HALL : A. H. BLECHYNDEN,
1*st Sept.*, 1856. *Secy. A. and H. Society.*

A. *Samples* 1 and 2, of cotton raised from acclimated Sea Island seed.

B. *Samples* 1 and 2, of *Kupas,* or cotton with seed, from acclimated Pettigulf seed.

C. *Sample* 1, of cotton raised from acclimated Pettigulf seed.

N. B. The above are merely musters of small bales.

Minute by Mr. W. Blundell.—On your samples sent with your favor of the 1st instant, I beg to give the following as my report and valuation :—

A. No. 1, quite suitable for English market, staple long and fine, but weak : worth probably in Liverpool 15*d.* to 16*d.* ⅌. ℔.

,, No. 2, also quite suitable: color, cleanness, and staple not so good, 12*d.* to 14*d.* ⅌ ℔.

B. No. 1, *not* suitable for Europe. Much the same as common Bengal cotton.

,, No. 2, suitable, and with the seed separated, or ginned, would probably bring 4*d.* to 4½*d.* ⅌ ℔. in England.

C. No. 1, quite suitable for England, and though the staple is short and weak, the color and cleanness are good. It would bring probably in England 5½*d.* to 6*d.* ⅌ ℔.

I would most particularly recommend to the Government to endeavour to obtain cotton seed from other parts besides the United States, as the produce of the cotton plant of different countries so very greatly varies: and I would particularly recommend to them the Seychelles, or Bourbon Island seed, (which was, I believe, the parent seed introduced into our West Indies:) the Egyptian cotton seed: and Brazil seed, say from Pernambuco and Maranam. My impression is we have gone wrong in confining ourselves to *American* seed, which does *not* take in India, at least not in Bengal. The other kinds I have mentioned, produce a different class of cotton, and excepting Sea Island, all more valuable than the other sorts of American, of which the bulk of the growth consists. The Brazil cotton is of long, strong and wiry staple, characteristics all wanting in the Bengal cotton, which render the latter of little value in Europe, indeed of less value than any cotton known.

Some of the Brazil merchants in Liverpool I doubt not would be happy to obtain seed, if applied to.

From the Mauritius and from Egypt the seed could be sent here direct.

I shall be glad if you would communicate to the Government what I have mentioned.

It seems to be now generally admitted that the consumption of cotton has overtaken the production; and it is consequently a matter of great national importance to extend the cultivation of cotton in *India,* to supply the increased wants of the English manufacturers.

It is not at all unlikely that the soil and climate of Bengal is not adapted to the growth of cotton. Other districts, both North and South, and also to the South-West, (I mean particularly the Madras and Bombay Presidencies,).promise to be more fortunate.

All that is wanted from them is an improved class of cotton, and in greater quantity.

September 3rd, 1856.

Minute by Mr. S. Douglas.—I have the pleasure to send you my report on the samples of Colonel Hannay's cotton, viz :—

A. No. 1, the produce of acclimated Sea Island seed, is a particularly good cotton, and in every respect suitable for the English market, but it is rather weak in the fibre, value about 16*d.* @ 18*d* ℔ ℔.

A. No. 2, Cotton of the same quality, but not in such good condition, value 15*d.* ℔ ℔.

B. Nos. 1 and 2, *Kupas*, raised from acclimated Pettigulph seed. This in its present condition is certainly not suitable for the English market, nor any other market, but the quality is better than the Bengal cotton, and when separated from the seed as shown in the sample marked

C. No. 1, is quite well adapted for the English market, and seems from what Col. Hannay writes, in his letter to Capt. Dalton of the 14th May, 1856, to be well worth cultivating, and probably the produce of new seed would be still better than this from the acclimated seed. The value of this sample is about 5½ ℔ ℔.

After being acquainted with Col. Hannay's experience of the utter failure of the Seychelles seed, I cannot agree with Mr. Blundell in recommending that description to be persevered with. But I think his suggestion to introduce Brazil seed is a good one.

September 9th, 1856.

Minute by Mr. J. Cowell.—I beg to report on the samples of Col. Hannay's Assam grown cottons.

A. No. 1, the produce of acclimated Sea Island seed. This is a good specimen, and resembles in some respects the best Egyptian kinds. It is of good complexion and soft, pretty long in staple, but not of such strength of fibre as the Sea Island cottons generally are. It is well adapted for the spinning of higher numbers of yarns. I should

A. No. 2, is similar to the above in quality, but not so well cleaned. Its value at home may be 13*d* to 14*d* ꝑ ℔.

B. Nos. 1 and 2, *Kupas,* the produce of acclimated Pettigulph seed. When divested of seed, as in the sample marked

C. No. 2, I consider it well suited to the home markets. It is of considerable strength, and the fibre, though short, like all the green seed varieties, is tolerably fair in length. It is not so harsh in feel as the indigenous cottons, and altogether it exhibits qualities which lead me to infer that it is a description which will bear well with the climate and soil of Assam.

I recommend the prosecution of its cultivation there, in preference to the black-seeded varieties of Seychelles or Bourbon, N. A. Sea Island, or Brazil, all which latter are of slow growth, of slow and sparing yield of pods, and will not, I think, requite the labour and expense devoted to their cultivation in this country, where the climate, from its humidity and the stiffness and tenacity of soil generally, are, I am of opinion, inimical to the favorable development of plant and fruit.

I estimate the value of the cleaned Pettigulph sample at 5*d* @ 5½ ꝑ ℔. at home, fully, in July last.

September 9*th,* 1856.

Minute by Mr. Joseph Willis.—A 1. Suitable for the European machine spinner, but considerably degenerated from that character which belongs to *good Sea Island Georgia cotton.*

There is to be found cotton of middling fair length, good fineness, middling strength, amidst large quantities of short length, great fineness and weakness.

I think it would be over valued at 15*d* @ 18*d* ꝑ ℔, and would rather assign to it about 11*d* @ 12*d* ꝑ ℔.

A. 2, Considerably inferior to A. 1, perhaps 25 to 50 per cent below it.

B. 1, A good deal stained and ill-colored, and thereby weakened.

Is of fair length, only moderate strength and good fineness; the seed well covered with fibre.

Cotton of its character would, if gathered in better condition, and well freed from the seed, be worth 5*d* to 5½*d.* per ℔., but in the condition of this specimen perhaps only 4*d* @ 4½*d* ⅌ ℔.

B. 2. Less free from stain and discoloration, and is thereby more strong and healthful. Is of fair length, pretty good strength, and in fineness somewhat inferior to the B 1. The seeds are well covered with fibre. The cotton if well divested, I value, at from 5*d.* to 5½*d.* ⅌ ℔.

C. Is very similar in general character to the fibre on the seed, B. 2, but appears to me to be scarcely so strong, and it may be of greater age, but I value it at 5*d.* ⅌ ℔. I beg to remark that fibre from its attachment to the seed, *if well got in,* is generally maintained in greater strength.

The above valuations being founded on the July, 1856, Liverpool prices of cotton.

Correspondence connected with the discovery of the Tea plant in Sylhet. Communicated by the Board of Revenue, L. P.

To the Secretary to the Agri-Horticultural Society.

Land Revenue,
H. Stainforth, Esq.

SIR,—I am directed by the Board of Revenue to forward herewith copy of a letter addressed to Government by the Magistrate of Sylhet, No. 197, dated the 6th instant, reporting further on the successful result of his search for the tea plant in Jynteeah, with the samples of the leaves received therewith.

2. The Board will be glad to be favored with the Society's opinion on the leaves.*

I have, &c.
E. T. TREVOR,
Officiating Secretary.

DATED FORT WILLIAM :
The 30th May, 1856.

To the Secretary to the Government of Bengal in the Judicial Department, Fort William.

SIR,—In continuation of my letter No. 76, of the 19th February, 1856, reporting upon the discovery of Tea in Sylhet, I have the honor to report still further upon the great success which has attended my search for the plant in Jynteeah, and my firm conviction that its discovery there may be turned to greater advantage than its discovery in any of the parts reported on before, either by Mr. Glover, the Collector, or myself. My reasons for being thus convinced are, that as Jynteeah has been surveyed, there would be, and is no difficulty, in judging, whether the lands situated in Jynteeah are settled or otherwise. A speculator therefore taking lands there, would at once see his way, and be aware of his possession, whereas in the pergunnahs of Ruffeenuggur, Chapghaut, &c., although the lands may be stated by Mr. Glover to be unsettled, I am convinced that in the event of any settlement being made now to speculators in tea, endless lawsuits, &c. would be the consequence. Another great reason is the price of labor in Jynteeah, the facility with which it may be procured, and last, though not least, the facility of carriage by water, the tea zillahs being situated almost on the banks of the river Soormah, the main river of Sylhet.

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* "I have carefully examined the leaves of the supposed tea plant of Jynteeah, and it is certainly all *Eurya*, not tea at all." *Extract of a letter from Dr. T. Thomson, dated 9th June,* 1856.

A living plant sent direct to the Society by Mr. Larkins, and received about the same time as the leaves above mentioned, was recognized by Dr. Thomson as true tea. Moreover, specimens of leaves and seeds submitted by Mr. Larkins at the meeting of the Society in February, 1856, were pronounced by Dr. Thomson to belong to the true tea plant.

On my proceeding to the interior of my district in the month of March, on my way to the Satoo district, I stopped at the thannah of Moolagool, which is situated on the banks of the river Soormah. I took some specimens of the tea leaf with me, and on passing left them with the Darogah, telling him to search the hills surrounding the thannah for the plant. On my return, the search had met with success; specimens were given to me, which I brought to Sylhet, and Dr. Barry, a gentleman connected with the tea culture, both in Assam and Cachar, on being shown them by me, pronounced them to be very beautiful specimens. I then ordered the trees to be counted, and have forbidden their being injured or cut down for the purpose of firewood, and as the *teelahs* on which they are situated are mostly *khas*, they are open to any adventurer that may feel disposed to settle for them, while those which are settled would most likely be procured from the Jynteeah *poorees*, (a harmless ignorant race) at a small profit to the original settler.

The spot of the present discovery is situated on the North-east corner of the district, on the North bank of the river Soormah, and as the crow flies about 25 miles from Sylhet, the journey to which place in the rainy season is easily accomplished in a small boat in a few hours owing to the force of the stream. The number of trees found amount in number to 1350, a specimen of the leaf I herewith enclose.

The first batch of trees are included in a space of about four miles square, and are all on *teelahs* bounded on the East by Dolanuddee, North by the Cossyah Hills, West by Tolea Nuddee, and South by Harnaghat and river Soormah.

The second batch are included in a square of about one mile and bounded East by *teelah* Pachpeerah Durgah, West by Kalijaree *teelah*, North by Burchera, South by Kallijooree village.

The third batch are included in a square of about two miles, and bounded on the East by cultivated land of Beorgool, West by Sooraj river, North by Ballichurra, and South by Goway Bheet.

These localities I must observe are all close to the thannah of Moolagool, and the river Soormah, and some of them are found on the map in the neighbourhood of Moolagool Haut. The names of the seven *teelahs* on which the trees (1350 in number) have been found are Balicherra (1) Sooreegool (2) Marapa (1) and Eraligool (3).

I also may report the discovery of the plant at Indephur, to the South of the station in thannah Hurryajeeah.

FOUZDARY COURT ZILLAH, I have, &c.
SYLHET: (Signed,) T. P. LARKINS,
The 6th May, 1856, *Magistrate.*

To the Secretary Agricultural and Horticultural Society.

Land Revenue,
H. Stainforth, Esq.

SIR,—In compliance with the request contained in the 3rd Para. of your letter, dated the 20th ultimo, I am directed by the Board of Revenue to furnish the Society with a copy of the Sylhet Magistrate's letter, which they have obtained from Government on the subject of the tea plantation.

2. The Board desire me to tender their thanks to the Society for the expression of its opinion on the leaves sent with my letter No. 205, dated the 3rd of May last.

I have, &c.
DATED FORT WILLIAM: E. T. TREVOR,
The 9th July, 1856. *Officiating Secretary.*

To the Secretary to the Government of Bengal in the Judicial Department, Fort William.

SIR,—In continuation of my letter No. 1, of the 4th January, I have the honor to report still further upon the discovery of the existence of the tea plant in this district, and more particularly as to the localities in which I have by investigation succeeded in establishing the indubitable fact of its being indigenous.

In my former report I mentioned merely its discovery in pergunnah Chandkhanee, the South-eastern point of this district. Since then I have had specimens brought in from the Eastern parts, viz., pergunnah Chapghaut, and during investigation in that pergunnah, it was discovered in still greater abundance in Singooe, in pergunnah Egarasuttee, and situated between Chandkhanee and Chapghaut. From this it may be reasonably inferred that the plant exists in the entire range of hills forming the Eastern boundary of this zillah from Chandkhanee to Chapghaut, thence North Eastward to Echamuttee (from which place specimens have also been sent in) thence all along the North Eastward and Northern boundary, constituting the Cossiah and Jynteeah hills, (as specimens have been sent in from Chela Poonjee to the North of the station), and thence to the very North-westward extremity, as far as Laour, where I understand that it exists in great quantities, on Mr. Henry Inglis' zemindaree, of the latter, however, I have not been favored with a specimen. Of all the spots mentioned, Singooe, in pergunnah Egarasuttee, seems to be the most flourishing in every respect, and is easy of communication, both in the dry and rainy seasons. There are also, it will be seen, ranges of smaller *teelahs,* or hills, within this main range, to the Westward, and reaching from the Eastern boundary more or less to Golabgunge, a distance of about 9 miles from the station, and where the Collector, Mr. Glover, informs me that tea has also been found. As the district of Sylhet is therefore inclosed by hills to the North, the East, and South, there is no reason why tea should not exist in all these three quarters. The fact of the matter is that people do not know in looking for tea what to look for, and all are astonished to think that the tea plant is not merely a shrub, but a tall stately tree, growing to 30, 40, and 50 feet in height, and in some instances too large in circumference to be clasped by one arm. Instead therefore of looking for a shrub, we must look for a tree. This fact I doubt not will lead to its discovery in other parts, as I shall now institute an investigation not of jungle, but of the trees *in* the jungle.

It is worthy of remark that the spot in pergunnah Chapghaut, where tea *has* been discovered is opposite (if I may use the expression) to the Cachar tea gardens, that is to say the Cachar gardens are on the Western declivities of the range of hills between that district and Sylhet, and the discovery in Sylhet is on the Eastern side. I only allude to that one pergunnah.

The range of *teelahs* (on some of which the station of Sylhet is built,) stretching from the station Northwards, North-eastwards, and Eastwards, would I should imagine afford ample space for tea-plantations and manufacturers to a large extent. The plant itself, has not, as yet, been discovered *there*, (though much search has been made,) but from the fact of some eight or ten trees, which were sent in to me on the discovery, having been planted in my own garden, and from their having thriven and become strong and sturdy plants, there seems no reason to suppose that the plant should not be capable of being transplanted, and reared on these *teelahs*. Here then we should have tea plantations in the very station itself, and the means of communication would be much more practicable at all times of the year, between this and Calcutta or Dacca, than between those places and Cachar. The only drawback would be the leases of the lands as far as pergunnah Chapghaut, Singooah, and Chandkhanee, are concerned, where the lands are decennially settled: but should the plant be found capable of thriving on the *teelahs* and North of the station, that difficulty would be surmounted, as these *teelahs*, are, I am led to understand, *khas*. In such case, the plan would be for speculators to take leases of these lands, and either to purchase the tea seed from the zemindars, in whose zemindaries tea has been discovered, or to rent the lands from them merely for the collection of seeds and plants.

In the event of grants of land being made here for tea cultivation, I agree with Mr. Glover, the Collector, that short leases should be granted. As to the means of throwing open the resources of the district, I need hardly mention the benefits that may be derived from this important discovery. Adventurers will be led to visit a part of India almost unknown, (except from its name in connection with *oranges*,) and will find in it the means of making fortunes, not only in the cultivation of tea, but by lime, coal, cinnamon, India rubber, and various other commodities too numerous to mention. Only let the Government open the means of communication, by establishing a steamer on the route from Dacca to Chatuk in the dry season, and to Sylhet and Cachar in the rains, and I imagine there would be no lack of adventurers and speculators in all and every branch, it is the want of *roads*, (or rather, I should say, the impossibility in such a low country of making them,) not being supplied in the rains by steam communication, that makes Sylhet such an unknown place. It would also be the means of making the station of Cherra Poonjee a sanatarium, for which it is so well adapted, Chatuk being only a few hours journey thence.

I will now proceed to report more particularly upon the localities in which the tea plant or tree has been discovered, viz. the pergunnahs Chapghaut and Egarasuttee.

Pergunnah Chapghaut.

1st. The spot were the tree was found here is hilly *teelah* land, called Mouzah Mohakul, Kittab Sootgool. The land is decennially settled and resumed. Lega settled land, belonging to the zemindar, Golam Jelance Chowdry. The plains and hills in the neighbourhood are also of the same description.

2nd. The four *teelahs* where the plants were found, marked in the accompanying map, each contains about four or five *koolbas* of land. Here there were not found more than two or four plants, and trees, and these at a distance of eight or ten cubits from the *teelahs*, and of a smaller sort growing on the declivities of the *teelahs*. The *teelah* marked A in the map, is about 150 cubits from the other *teelahs*. On the North-east point of this *teelah*, was observed a crop of rice, extending North and South, this will give some idea of the soil and climate.

3rd. To the South of this place is the river Gheelay Cherra, 16 or 17 feet in width, and to the North-west of it about three or four *koolbas* distant, is the river Goomtee, 50 or 60 feet in breadth. In the dry weather it dries up considerably, but in the rains it is a fine stream, capable of floating a good-sized boat; were a bund to be constructed on its lower side, it would be passable for large boats all the year round. On the Western side between this range and the next range of hills are plains totally inundated in the rainy season.

4th. Bhangah Bazar is situated at a distance of about four or five miles from this spot to the North-west. It is a large bazar, and here every kind of edible is sold; there is also another bazar, called Darzhar Bazar, about a mile to the North-west, also the Sreeghur Bazar to the West, about a mile distant. There are also other bazars, so that labourers in the tea plantations could be well supplied as far as food is concerned. At a short distance are to be found natives of every caste, including chandals, dooms, malees, coolies. The rate of labor is three or four Rupees per mensem.

The place is situated to the North-east of the station, a journey for a native *at* present of about two days; as the crow flies, it is about forty miles distance. There is always water carriage between Sylhet and Bangah during the entire rainy and dry season, and large boats are capable of transit. It is on the opposite side of this range, as is seen in the map, that the Cachar plantations are situated, at a distance of some few miles, but with an intervening impenetrable jungle.

Pergunnah Egarasuttee.

The spot where the tea plant has been discovered in this pergunnah is in hilly lands, appertaining to Manga Khalee, Kitie Kullee Bulloe, No. 221 Talook Mehal Joom, belonging to Brejosoondery Chowdranee, and Bishnoopersaud Moonshy's decennially settled land. The neighbouring hills are also of the same description.

2nd. These *teelahs* (on which the tea plants were found in this pergunnah) contain about six or seven *koolbas* of land; the tea trees grow on the declivities of these hills. At about 4, 5, 8, 10, 12, or 13 cubits distant, are 14 or 15 larger trees, ranging from 15 to 30 cubits in height, and 16 to 25 inches in circumference. There are also 25 or 30 middling sized and smaller trees nearer to each other. On another contiguous *teelah* about two or three *koolbas* distant from this, containing about four or five *koolbas* of land were observed five or six larger and eight or ten smaller trees.

With the exception of a few other trees and bamboos, there is no dense *jungle* of any description in the neighbourhood of the plants in this pergunnah, which could of course be of the greatest benefit in cultivating the plant. The spot is exceedingly picturesque, surrounded by villages and with streams, rivers, and bazaars, in the immediate neighbourhood. It is situated about a mile from the village of Baklacandy from which place to it there is a road on the North-east. There is no doubt therefore that this spot would be a most advantageous one for adventurers.

To the West of the spot is a large Bheel, called Sinhill, to which there is a water passage open from the main river, the Soorma, all the year round, in the dry season for small boats, and in the rains for large boats; to the North-west is the river Kochooa, about five miles distant. The country in this neighbourhood being high is not subject to inundation in the rains. At a distance of eight or ten miles to the South-west is the bazar, &c., of Chargoola, where there is also a stockade, guarded by a detachment of the Sylhet Light Infantry Battalion, and established to prevent any incursions of the Kookies. To the East of the hills is also the bazar of Hylacandy, situated in the jurisdiction of Cachar. There is a road through the hills to this bazar. Labor of every description is obtainable here at from three to four Rupees per mensem. The spot is two and half days' journey from Sylhet, and approachable as near as Singbeel all through the year by boat.

To the South again of these hills, called Singooah, are the Chandkhanee hills, where tea was first discovered, which has been reported upon by the Collector, Mr. Glover.

Herewith I beg to enclose specimens of flower of the tea plant procured in Surgooa hills, also leaves from the Cachar gardens, from pergunnah Egarasuttee, (Singooah) from pergunnah Chapghaut, from pergunnah Echamuttee, Chela Poonjee, and the Cossiah hills, also specimens of the pods, seeds, &c. The flower is not to be found just now in very great abundance, this not being the season of the year. If therefore you consider it worthy of notice, I should feel obliged by the specimens and a copy of this report being transmitted to the Agricultural Society of India.

SYLHET, I have, &c.
February 19*th*, 1856. (Signed,) T. P. LARKINS,
Magistrate.

To the Secretary to the Agricultural and Horticultural Society.

Land Revenue : H. Stainforth, Esq.

SIR,—In continuation of my letter No. 267, dated the 9th ultimo, I am directed by the Board of Revenue, at the instance of Government, to forward herewith the box of sample tea flowers, leaves, &c. referred to in the last para. of the letter from the Magistrate of Sylhet, No. 76, dated the 19th February last.

I have, &c.,
E. T. TREVOR,
Officiating-Secretary.

DATED FORT WILLIAM :
The 15*th August*, 1856.

Report by Dr. THOMAS THOMSON, *dated Botanic Garden, October* 1*st*, 1856, *on the above specimens.*

I have carefully compared the specimens from the Board of Revenue, which you forwarded to me for examination, and have now the pleasure of sending the results.

The seeds from the Singooah Hills, Zillah Sylhet, the branch with leaves, the flowers, and the ripe capsules, with seeds from the Singooah hills, pergunnah Egarasuttee, and the branch with leaves from the Cachar plantations, are all tea, the leaves in all agreeing with those of the indigenous Assam tea.

The specimen of detached leaves "from the Cossiah hills," appears also to be tea, but leaves alone are perhaps not an infallible guide. I should like to know more particularly the locality whence these specimens came.

The leaves from Chella Poonjee are not tea, but belong to a specie of *Symplocos*, and those from pergunnah Chapghaut, zillah Sylhet, are also not tea, but belong to two different plants, the branch with opposite leaves being a plant of the *Oleaceous* family, probably *Linociera macrophylla*, Wall. the other a species of *Symplocos.*

Note on the Rusot, or inspissated juice of Berberis aristata.

By Capt. W. H. LOWTHER.

The specimen of Rusot, or inspissated juice of *Berberis aristata*, now submitted to the Society, was prepared by me at Hawulbagh in Kumaon three years ago. It is valuable as a febrifuge, a dye, and a pigment, and was used by me for those several purposes. The formula employed on the occasion was as follows. I procured the fresh roots of the berberry, and chopped them into small chips with a hatchet: these I crammed, to the amount of ten pounds, into a large native *gurrah*, filling up to the neck with water. I then boiled them for two hours over a very slow fire, until one-fourth of the liquid was evaporated, and renewed the chips and remainder of the process as above three times. I then strained the extract through a coarse cloth, squeezing the chips, so as to obtain the most valuable portion of the juice.

I then poured the thick liquid into a tin tray, and exposed it to the full rays of the July sun. This latter part of the process is indispensable, and prevents any tendency to mouldiness, or fermentation. The sample now presented has in no way deteriorated, although exposed to a variety of climates.

The dye is prepared by boiling a sufficient quantity in distilled water, choosing the required shade, and then leaving the articles to be dyed, (they having been previously treated with an alum mordant,) until of a proper hue. By a delicate process of combination with indigo, I obtained a very fine green, which only requires a little chemical experiment to render it valuable. As a pigment, I can recommend it for all the pale tints, either alone, or with indigo, using a little of the purest gum water colourless, to fix it on the paper. For oil paintings it seems well adapted, after drying and pulverising as in the case of other coarser materials.

But it is in the form of a highly curative and economical antiperiodic that I am principally inclined to praise its virtues. For some years I have entertained an unaltered opinion of this febrifuge, first described by the talented O'Shaughnessy, and recently by the unbiassed Dr. Macpherson. Even in the *crude form,* I found the berberry an ever useful and present auxiliary in the fever-stricken *khuds* and rice swamps of the Himalayahs. In proof of its simple efficacy, I will only trouble your pages with a small anecdote. During the incessant rains of 1853, myself and a fellow tourist were travelling in the unhealthy district of Baghesur in Kalee Kemaon ; our servants and baggage had preceded us some hours, and were miles ahead, my friend had been a great martyr to Indian fevers, and while we were ascending a most uncomfortable precipitous mountain, he was suddenly seized with an acute paroxysm, and fell almost senseless on the ground. Here was a predicament for two European travellers, not a habitation for miles, not a servant, not even a villager to be seen: the small bottle of quinine too, which was always carried near us by one of our shikarries, had by the same ill luck departed in his keeping towards our distant camp—what was I to do? At that instant a berberry bush recalled to my memory that I possessed a curative simple which I ought to employ, and I was quickly engaged in scraping a piece of its root into a goblet of water. Having succeeded in making a strong infusion, I poured it down the sick man's throat, and in less than an hour we two pedestrians were again climbing the steep hills, my friend declaring that I had cured him magically. The mountaineers of those provinces all employ the berberry in fevers, as I subsequently ascertained.

Remarks on a disease affecting the Bombay or Red Sugar Cane, in certain districts of Bengal: communicated by BABOO JOYKISSEN MOOKERJEE.

I have the honor to submit, for the information of the Agri-Horticultural Society, the following circumstances connected with the cultivation, growth, and finally entire destruction of the red sugar canes, commonly called Bombay canes, in the districts of Rungpore, Hooghly, and in a portion of Burdwan. I have not been able to ascertain whether the red cane was first brought from Bombay, or from any other place: it is different from the large white canes generally believed to have been imported from the Otaheite islands.

The two species of sugar canes known in this country by the names of Kajlee and Pooree canes have from time immemorial been cultivated in the districts of Rungpore and Hooghly in common with other districts, but since the increase of the demand of sugar for exportation, the culture of these canes has increased considerably. The crops of these canes had almost always given good returns, except at bad seasons, when it failed considerably, but no account of the total failure of these canes, as has been the case with the Bombay red ones, can be gathered from the oldest inhabitant.

About twenty-five years ago, Mr. McDowall, of the Kissoreegunge Indigo concern, introduced the red canes in the district of Rungpore, hence the natives of that place call these canes "Shahiban Koosar". On comparison, the experimental cultivators were convinced that the new canes had more saccharine matter in them than the country ones, and that they grew larger and yielded more juice than the latter, so much so, that the pecuniary gain to the ryot was more than twice the product of the other. Thus in a very few years the neighbouring fields of Kissoreegunge were covered with these canes. In about eight or ten years these canes were introduced in most of the Northern parts of the district, and from thence gradually spread over throughout the Southern parts too.

The mode of preparing the lands is the same as that of the country cane. After ploughing, the lands are manured with cowdung and refuse of Indigo vats. The fields being well prepared, the cuttings are planted in lines; when these take their roots, and begin to shoot out, the earth about them is loosened and cleared of common herbs and grass. After a few weeks, when the canes grow a foot and more high, they are weeded, and manured with mustard oil cakes, and as the canes grow higher, four or more of their heads or tufts are taken together, and their leaves wound round them, and four or more of such wound-up bundles of the cane tufts are again tied together in the same manner. In this state they are allowed to grow till ripe for reaping. The canes when ripe are reaped and carried to the mills, where they are cut in small pieces for being pressed, and the fields cleared of grass, &c. A few days after, new shoots begin to make their appearance out of the roots, and the fields are then taken care of, weeded, and the earth loosened and manured, and the heads tied together as in the first instance. In a similar manner a third crop is also reaped from the same field. In the first and third years the produce of the Shahiban canes were moderate, but in the second year they yielded a far superior crop. In the fourth year some of these fields are ploughed and manured, and some other crops are cultivated, but in some instances the lands are left uncultivated for renewing the fertility of the soil. For some years the Shahiban canes were very luxuriant in this district, and the cultivation of the country canes decreased in the proportion the other was introduced.

About four years ago the disease (the natives call it *dhosah*) which proved fatal, and totally destroyed the culture of one of the much esteemed and principal harvests of the district, began to make its appearance. A few cane bushes out of a field of one *don* (thirteen cottahs) appeared withered in the first year. The next year more than two-thirds of each of the cane fields shared the same fate. In the first year very little attention was paid to this subject, but the cultivators were alarmed in the next, and commenced enquiring into the matter. On dissection, the piths of the canes were found of a reddish color, and eaten up by worms of reddish white color with a black mark or spot on their mouth. In the third or last year, whole fields were destroyed. From the stinking smell of the canes thus destroyed, it became hardly possible for men to pass by these fields, much less their being fit for consumption by human beings, or even by cattle. After some experiments, such as putting less or more manure, and shifting the cultivation from one to another field, the disappointed cultivators gave up the culture of the red cane in despair, and re-introduced that of the country canes (Kajlee and Pooree), which seems to be promising.

It is upwards of twenty years since the red or Bombay cane was introduced in the district of Hooghly from Nungy Bunglow, a place a few miles below Calcutta. At first they were cultivated at Bally, Rugoonathpore, Ooterparah, and its neighbourhood; from thence it gradually spread over to the banks of the Damoodah in a few years, and latterly on the western bank of that river close to pergunnah Chunderkonah.

The mode of cultivation, &c., nearly corresponds with that of Rungpore. Instead of mustard oil cake exclusively and refuse of Indigo vats, the cane fields of this district are manured sometimes with mustard oil, and at other times with castor oil cakes. The ryots of Hooghly generally reap from richer alluvial soils three, and in inland soils two crops consecutively from the same cuttings. Afterwards, for a year sometimes two, *dhuncheea* reed, indigo, or other crops, not only of a less exhausting kind, but the juice and leaves of which go a great way in restoring strength to the land, are cultivated on the same field. In this rotation red canes and indigo and other easy crops followed each other. In those places, where the red canes were planted earliest, *i. e.*, about twenty years, the disease appeared slightly about two years ago. Last year the decay increased, and this year total destruction has taken place. Where this cane has been introduced only lately or ten or fifteen years ago, there the crops, though they have somewhat suffered this year from excess of rains, yet they are free from the disease. In the lands of the Burdwan district bordering Hooghly a similar result has taken place. The new cane is only being gradually introduced in the interior of Burdwan. The process of destruction and disease in this district is similar to that of Rungpore. I have not been able to find out so accurately the result of this cane cultivation in other districts, but from what I have heard generally, I fear it is equally distressing.

The people of the affected districts are unable to assign any other cause for this catastrophe, than that of the red cane being of a very exhaustive nature.

The country cane is known to have been cultivated every second year alternately with indigo and other easy crops in the same field from time immemorial. It is yet a moot question whether after a lapse of ten or fifteen years the same fields will again bear the cultivation of red cane from healthy cuttings or not. The subject is worthy the attention of the Society as it affects, and will ultimately affect in a larger proportion, the production of sugar in this country, which is my apology for occupying the time of the Society.

Report on Cotton raised in the Society's Garden from North American stock.

To the MEMBERS OF THE COTTON COMMITTEE.

GENTLEMEN,—I beg to circulate, for the favour of your opinion, three musters of Cotton (as per list annexed) the produce of the Society's garden. I also circulate, for the sake of comparison, three other musters, as detailed.

In respect to sample A, I may mention that it forms only a small portion of what was submitted by the Gardener; the greater portion of it, as also the whole of the first gathering, in September, 1854, from the same plants, having been forwarded, by order of the Society, to Mr. Bazley of Manchester, from whom we have not yet received an acknowledgement of its having reached its destination.

I have put in the box a copy of the Journal, Vol. IX, Part 1, in which, at page 70 of the "proceedings of the Society," you will find recorded your opinion on the first gathering of the cotton raised from the Eddisto Island seed. A copy of my letter to Mr. Bazley also accompanies.

Yours, &c.,

METCALFE HALL: A. H. BLECHYNDEN,
April 25th, 1856. *Secretary A. and H. Society.*

Specimens of Kupass and Cotton.

No. 1. Specimen of Kupass from plants raised in the Society's garden from *acclimated* Eddisto Island seed. This Kupass was picked in March, 1856. The *imported* seed was presented by Mr. J. L. Nash in December, 1853.

No. 2. Specimen of Kupass from plants raised in the Society's garden from Melbourne seed of Sea Island stock, presented by W. Blundell, Esq., in March, 1855. Picked in March, 1856.

No. 3. Specimen of Kupass from plants raised in the Society's garden from imported Sea Island seed, presented by W. Blundell, Esq., in March, 1855. Gathered in March, 1856.

Specimens of Cotton for comparison.

A. *To compare with No.* 1.—Cotton raised in the Society's garden from the Eddisto Island seed, presented by Mr. Nash in December, 1853. *Second* gathering in March, 1855. *First* gathering, in September 1854, sent to Mr. Bazley.

B. *To compare with No.* 2.—Specimen of Melbourne Cotton received from Mr. Bazley in September, 1854.

C. *To compare with No.* 3.—Specimen of Sea Island Cotton, received from Mr. Bazley in September, 1854.

THOS. BAZLEY, ESQ.
Manchester.

DEAR SIR,—You were kind enough to tell me, when I had the pleasure of seeing you in September last, that you would readily receive and report on any musters of cotton which the Agricultural and Horticultural Society sent to you. Having communicated this message to the Society they bid me, in expressing their thanks for your obliging offer, to say that they gladly avail themselves of it. I have now the pleasure to advise the despatch through the Society's Agents, (Messrs. Grindlay and Co., of 63, Cornhill, London,) of a small muster of cotton, the produce of the Society's garden. In December, 1853, Mr. J. Lambert Nash presented the Society with a small quantity (about a pound weight) of Sea Island seed from Mr. W. Seabrooke's plantation in Eddisto Island, Charleston, S. Carolina; which plantation, Mr. Nash stated, is said "to yield the finest description of cotton yet produced, and which gained a medal at the Great Exhibition, and was declared by the Manchester spinners to be the finest ever imported into England." The seed was sown by the Society's Gardener in January, 1854, and in September last he gathered a small quantity, of which the sample now sent is a portion. The plot of ground on which this cotton was raised was unmanured, and the plants merely received ordinary attention. The Society's Committee have reported so favorably of the quality of this cotton, that it has been determined to repeat the experiment on a much more extended scale with the acclimated seed, and with imported seed, for which a communication has been made to Mr. Seabrooke, with a request for a supply to the extent of £25. The Committee valued this muster in Nov. last, at 2*s* 6d per ℔. I think you will find it bear favorable comparison with the Australian cotton, of which you gave me a sample, valued at the same figure.

I hope to have the pleasure of sending you, in due course, much larger specimens of the result of the extended experiments referred to. It seems pretty evident that if cotton like this can be raised, even at a cost of three or four times that of the common country cotton, it would still leave a fair margin of profit to the grower.

Yours, &c.,
(Signed,) A. H. BLECHYNDEN,
April 25th, 1855. *Secretary A. and H. Society.*

Report by Mr. S. Douglas.—Comparing sample of Kupass No. 1, with the cotton A. I find the quantity of the former has deteriorated in color, length, and strength of fibre. It appears to be rather varied in quality, the produce of some pods being much finer than others, but as a sample of cotton grown in this country, it is altogether very superior in all the characteristics of fine cotton.

No. 2, compared with B, has preserved its character better than No. 1 has done, I think, but it is much inferior to B in length of staple and strength of fibre.

No. 3. This sample has so little analogy to the sample C, that no comparison will stand between them. C is greatly superior in every respect to the country grown cotton.

April 25th, 1856.

Report by Mr. Blundell.—I find No. 1 Kupass, compared with sample A, to be inferior in color, and in fineness, length and strength of staple. This Kupass, a cotton of this year, appears to be assuming a different character, shewing *that woolliness and weakness of staple*, which is peculiar to the indigenous cotton of India.

No. 2 Kupass, compared with sample B, shews, in my opinion, exceedingly well, as far as I can judge, in its present *unginned* state. I am disposed to think that after being ginned, or cleaned, it would bring in Liverpool the same price as the sample B, Australian cotton.

No. 3 Kupass, compared with sample C, is inferior, both in color and staple. It occurs to me that it will be well to observe whether or not cotton grown in India from United States seed does not *sooner* degenerate in quality, than that grown from any other imported seed. The best specimens of cotton which I have seen are those grown from Seychelles, or Bourbon seed; and the present sample B from Australian seed.

If the samples of this year's pickings be sent to England I would beg to suggest that they be previously deprived of the seed.

April 28*th,* 1856.

Report by Mr. Joseph Willis.—*No.* 1.—Kupass from the Society's garden, gathered March, 1856, from seed acclimated there, from the imported Eddisto Island *seed,* say Sea Island kind, to be compared with the produce of the first year's growth of cotton in 1854 of the same locality, grown from the originally imported seed, as found in packet A cotton, and reported on. On comparison with the first grown cotton produced here in 1854 from the imported seed, I find great deterioration in this first year's acclimated issue. Its color is poor, being of the pale blue milky hue, which is generally accepted as an indication of poverty in cotton fibre. The yellowness here and there apparent being from water stained seed. Its fibre is various; some passibly good, being tolerably long, fine, and strong; some short, flimsy and weak; and some acquiring the more advanced changes of acclimation, which tend to assimilation with the indigenous country cotton, as exemplified in the furring of the seed, the greater tenacity of the fibre thereto, and its increased shortness and coarseness, but yet well maintained strength.

Without attempting to define the comparative value betwixt the produce No. 1 and A, which could only be properly determined on having the cotton fibre well divested of the seed, and on its being well amalgamated, it is sufficient to say that the difference is very great indeed, and beyond what might have been expected in only one year's descent of acclimation; but still if well divested and well amalgamated, the value would very greatly exceed that of the ordinary cotton indigenous of Bengal, generally speaking.

We have thus in this case but another instance of the change and deterioration which nature exhibits in the vegetable world, by cultivating from *the same race in the same locality*, and possibly without change or amendment of the soil; but of the cause and circumstances in the cultivation, there are no particulars from the Gardener given.

No. 2 Kupass from the Society's garden, gathered March, 1856, from the imported seed of Sea Island stock; *parented*, or grown at Melbourne, Australia, as given by Mr. Blundell, to be compared with the original Melbourne grown cotton in packet B, and reported on.

Now although this Kupass is the first produce from the parental Melbourne Sea Island seed, I find it,—with a considerable *abatement*, however, of the detractive remarks which belong to my report on the 2nd growth or acclimated produce of Eddisto Island, Sea Island seed kind as annexed,—still shewing the progress of deterioration. *Each particular character* given of my said report, I find in some degree applicable here.

When compared with the muster of Australian Melbourne grown Sea Island cotton in packet marked B, it bears no near relation in excellence and value.

No. 3 Kupass, the first produce from Sea Island seed imported direct, as given by Mr. Blundell in March, 1855, and cultivated at the Society's garden in 1855, and gathered in March, 1856, to be compared with the specimen of Sea Island cotton furnished by Mr. Bazley of Manchester in packet marked C, and valued at 2*s.* ℔ ℔.

On this Kupass I have but to repeat the same observations as made previously, and which more especially relate to the No. 1 Kupass, the acclimated Eddisto Island's growth; the detractive remarks there given having greater force in this No. 3 Kupass, than they have in the No. 2 Kupass, in descent from the Melbourne stock.

I have to observe that on comparing the fibre of this Kupass No. 3 with the Sea Island cotton in packet marked C, I find the difference and disparity in the said No. 3 admit of no near approximation whatever.

The value of the fibre of No. 3, is more than 50 ℔ cent. beneath that of muster cotton in packet C.

Finally, as respects the whole and each of the three specimens of Kupass Nos. 1, 2 and 3, the gatherings of 1856, I observe in them the same hue of poverty, and a great deal of water stained in each.

Thus the impression is conveyed of a season rather uncongenial than congenial to have attended their growth and gathering; and I make this remark in the absence of any report accompanying the specimens from the Gardener, which, had it been given, might have better explained or shewn why and wherefore the deterioration is so great, and so sudden.

May 8th, 1856.

Report by Mr. J. Cowell.—I have examined the three samples of acclimated Kupass cotton, and have to observe a marked depreciation in all from their original or parent stock.

I find on comparing No. 1, Eddisto Sea Island, of this year's gathering, with A of the production of 1854, that its colour is sickly, and fibre generally weak and short, though it varies in this respect, and also in its feel or touch, being harsher, and more assimilating to the indigenous cottons of the country.

No. 2 Kupass, from Melbourne seed gathered in March 1856, on comparison with the sample marked B, grown at Melbourne, presents the same features of depreciation as the Eddisto Sea Island No. 1, but not in so marked a degree. I have grown some of this acclimated cotton seed in my own garden this year, 1855-56, and I think the production is pretty much the same in quality as the parent sample, although the heavy rains in March, when the pods were opening, stained their contents by mildew.

No. 3 Kupass, grown at the Society's garden from imported Sea Island seed, when compared with the beautiful sample in packet C, (which latter I presume was grown in the United States,) shows a great and unfavourable difference in colour, and in fibre it partakes more than the two other samples of the characteristics of country grown cotton, being harsh and rough in feel, and short in staple, although these defects, as usual, appear to be compensated by increased strength.

I am confirmed in my opinion by a close inspection of these three samples, that these Sea Island cottons are not generally adapted to the hard and stiff soils of Bengal; they will probably thrive better near the sea coast, where the soil partakes more of sand than clay, and consequently is more light and open, thus allowing the tap roots to strike deeper and not laterally, and which latter circumstance is productive of pods smaller in size, and of a deterioration in the quality of the cotton.

13*th May*, 1856.

Report on Tamarind and Sunflower Oil.

To the **Members of the Oil and Oil Seed Committee.**

Gentlemen,—By direction of the Society, I beg to circulate, for the favor of your opinion, certain specimens of oil and oil cake, received from Captain Thos. Davies, Superintendent of Police, Booldana, and Mr. Michael Betts of Berhampore. Mr. Betts' letter, in original, is annexed, and an extract of Captain Davies' letter.

Yours, &c.,

Metcalfe Hall:
April 24th, 1856.

A. H. Blechynden,
Secy. A. H. Society.

A small specimen of oil of the tamarind seed from Captain Thomas Davies.

A large specimen of oil of the sunflower seed, and specimen of cake from ditto, from Mr. Michael Betts.

Extract of a letter from Captain Davies.

"While trying, as an experiment, the extraction of oils from some jungle seeds, I happened to order a trial to be made of the seeds of the common Indian tamarind, and to my great surprise, and that of all the Natives, I obtained an oil of a fine amber color, free of smell, and sweet to the taste; and, in my opinion, it would prove a substitute for the usual olive oil of commerce, so much in use in India for culinary purposes, and so frequently adulterated."

I have now the pleasure to give you further information on a second trial of *sunflower seed oil.*

From 6 cottahs of land I have gathered 9½ seers of seed, which has produced 15 chittacks of oil, and 6 seers of cake. This is greedily ate by the cattle.

In answer to your friend's questions: First, "Whether chemical agent has been used in the extraction?"—None.

The seed has been crushed in a common Bengali mill, and the oil passed through calico; secondly, "The quantity he could supply;" and, thirdly, "The price at which it could be delivered." To the two last questions I can only reply that it would depend entirely on the demand, and prices obtainable in Calcutta, to encourage the growth.

I have again sown 4 chatties of the seed on 16 cottahs of land, the result of this my *third* experiment will be communicated to you in due course of time.

December 26th, 1855, M. BETTS.

Report by Mr. J. Cowell.—I have examined the samples of oil and oil-cake you sent me.

1*st*. The oil from the *sunflower seed* I have seen before somewhere, but in a still more clear or depurated condition than is this specimen of Mr. Betts. It is doubtless a valuable commercial oil, being bright, sweet, very fluid from its extreme freedom from mucilage, and in my opinion would be an excellent substitute for olive oil in many culinary preparations. It resembles teel oil somewhat in smell and flavour, which latter is esteemed at home for several purposes, and sells at £50 to £54 per ton. Mr. Betts should send home a barrel or two of this oil, so that practical manufacturers may pronounce to what uses it is adapted. I think it would answer for the dressing of wool and other purposes, for which olive oil is so largely consumed in Great Britain.

2nd. The oil extracted from the common *tamarind seeds*, and sent to us by Captain Davies of Booldana, is a superior article, and I think would be found very useful in the preparation of varnishes and painter's colours, owing to its pale bright colour, and to its extreme lightness and fluidity. In smell, it remarkably resembles the linseed oil of commerce, and I think it would prove, an excellent, though perhaps an expensive, substitute for the latter. Captain Davies' discovery (if such it be) I consider an important one, and I would recommend him to send a sample of this oil to the Society of Arts in London, for their opinion as to its suitability to general purposes in the arts. I presume the cost of this oil would not exceed 8 or 10 Rs. per maund.

3rd. The oil-cake from the sunflower seed is sweet and good, and would be useful fodder to cattle, which, as Mr. Betts says, greedily devour it, but as a manure its virtues have yet to be tested. Its money value it is difficult to arrive at, as the cake is so little known.

Report by Baboo Ramgopaul Ghose.—I have never heard before of the oil of tamarind seed, and if this is a discovery it may prove to be an important one.

It is a clear bright oil, and is not only likely to be useful as a substitute for linseed oil, but I think would do well as a burning oil. The smell resembling that of linseed oil is probably the effect of age; when fresh I dare say there is no smell. I have burnt a cotton wick wetted with this oil. It gives a very clear light, and emits scarcely any smoke or smell.

This seed goes by the name of *kye bechee* in Bengal, and much of it is thrown away as useless. In times of scarcity poor people eat it fried to a limited extent. It is also used to some little extent as a sort of varnish, prepared by boiling, in the painting of idols, in finishing *kurpa* cloth, and *tulat* paper.* But the entire consumption for all these purposes, is very small, and the great bulk of these seeds is thrown away as mere rubbish. I think therefore large quantities of the seed could be procured at a trifling cost, and if the percentage of oil does not prove infinitessimally small, this will become an economical and important product.

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* A polished yellow colored paper on which Sanskrit MSS. are usually written.

I think any quantity of this oil could be sold at present at 10 Rs. per maund. Captain Davies should be requested to continue his experiments, and to send us an estimate of the cost.

This oil from the sunflower seed is pretty well known. It would doubtless be used for many useful purposes, more particularly I think for the lubrication of machinery. I much question, however, if it will ever become an important article of commerce, as I do not think it can be produced at a cost which will enable it to compete with other oils of a similar character, and Mr. Betts' statement, seems to bear this out. A seer and half of seed to a cottah of land is poor produce, and 10 per cent oil from the seeds is a still more unsatisfactory result. Unless both the produce of seeds and the per centage of oil, can be very greatly improved, it will not pay to cultivate the sunflower for its oil seed.

Judging by the samples of the tamarind seed oil it is worth 10 Rs., this oil would be barely worth 8 Rs. per maund.

The cake of the sunflower seed is doubtless excellent food for cattle.

This seed seems to be used for several purposes in Russia as per extract annexed:—

" On inquiring into the use made of the sunflower, we were given to understand that it is here (in Tartary) raised chiefly for the oil expressed from it. But it is also of use for many other purposes. In the market places of the larger towns we often found the people eating the seeds, which, when boiled in water, taste not unlike the boiled Indian corn eaten by the Turks. In some districts of Russia the seeds are employed with great success in fattening poultry; they are also said to increase the number of eggs more than any other kind of grain. Pheasants and partridges eat them with great avidity, and find the same effects from them as other birds. The dried leaves are given to cattle in place of straw; and the withered stalks are said to produce a considerable quantity of alkali."—*Bremner's Interior of Russia.*

Extract of a letter from Capt. THOMAS DAVIES, *Booldana, dated August 9th,* 1856, *giving further particulars regarding the tamarind oil.*

"I have the pleasure to annex a list of oils and sundries packed this day, and posted by the banghy dâk to your address.

"I feel very thankful to the Committee for doing me the honor of reporting on the oil of the tamarind seed. I repeat that mere accident led me originally to experimentalize on the seed. I have sent the oil which remained; from the bottle being allowed to stand undisturbed on a shelf, the oil has become very limpid.

"The smell of linseed alluded to in the report of one of the members, is attributable to the mill in which the seeds were expressed having been in general use for extraction of linseed oil, and the wood naturally imbibed the odour of the substance used in the mill.

"The preparation of the oil was thus:—

"Ten maunds of the seeds of the tamarind were collected, put to steep in water, until the outer cuticle softened sufficiently to permit of its being pealed off, in other words blanched, as almond kernels are; then the white remaining substance was submitted to the process of extraction in a wooden mill generally called *kooloo* by the *talees* or oil sellers. This mill is not in universal use in the Deccan, it is worked by one bullock only, and that in general by *talees* from Hindoostan. To prevent any adulteration, one of my government sepoys was detailed to watch the process. I am now engaged in collecting tamarind seeds for some more oil."

Report on Flax raised by CHARLES GUBBINS, ESQ., *at Allyghur, from Foreign and Native seed.*

To the MEMBERS OF THE FLAX AND HEMP COMMITTEE.

GENTLEMEN,—I beg to circulate, for the favor of your opinion, two* specimens of flax just received from C. Gubbins, Esq., Civil and Sessions Judge of Allyghur. Mr. Gubbins does not state in his letter of the 4th April (which is annexed) whether these specimens are the produce of foreign or country seed, but, from the context, it is probable they have been raised from the foreign seed, Dutch or Riga, supplied to him last year by the Society. Mr. Gubbins is desirous of learning whether these specimens are considered "of a good color, and stronger than that which is ordinarily obtained by the retting process."

Mr. Stalkartt (see last meeting's proceedings) has also been making some experiments of preparing flax fibre without water retting: and the same mode is now being followed out in Ireland for fibre required "for certain coarse purposes;" (see p. 26 foot note of my accompanying treatise on the cultivation and manufacture of flax,) Mr. Haworth likewise recommends the adoption of this process, that is to say, "not to steep at all, but to extract as much of the woody stalk by mechanical means as possible." (See Vol. IX. part 2, p. 186, *Journal A. and H. Society*.)

Yours, &c.,

METCALFE HALL: A. H. BLECHYNDEN,
April 17th, 1856. *Secretary A. and H. Society.*

Extract of Mr. Gubbins' letter:

"I have just pulled all the flax which I had grown in my garden this year, from Dutch, Riga, and country seed.

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* *1st. trial*, without wetting, beaten with a wooden mallet on a bed of sand.

2nd. trial, treated like sunn, neither wetted nor beaten, but the fibre stripped off by the hand.

"The two first kinds were supplied by you, and were sown October 18th, viz. as soon as they arrived. The Dutch came up freely, the Riga less so, only about half the number of seed germinated. The two crops sown side by side grew very even in single clean stalks, branching only towards the head, to an average height of three feet nine inches. They occupied 117 square yards, and have produced 12 ℔s. of seed.

"I mentioned to you last autumn that I was endeavouring to raise flax by earlier sowing. It appeared to me likely that the plant would be drawn out by a warm sun to a greater length of stalk, if sown in August, than if sown in October.

"My first two sowings of the beginning and middle of August germinated beautifully, but were successively killed by the sun's heat.

"That sown on the 2nd September survived, but instead of being a taller plant it is much shorter than that which grew last year, being only two and a half feet high, and the stem shrubby and branched, with many stems proceeding from one root. Finding that the Europe seed which was sown full late grew so much faster than that sown earlier, I bethought me to experiment with a very late sowing, and put some country seed into the ground in the first week of February. This is coming up well, and, despite the intense heat of last month, when the sun's rays were registered as high as 189°, thrives; it is now seven inches high, with clean stems, and thus promises well. (If it succeeds I will give you further memorandum of the experiment).

"I have this year allowed the seed to ripen before pulling the plant, both because I find from your remarks that you do not consider it necessary to sacrifice the quality of the seed for the sake of the fibre, and that the culture of the plant would be far more likely to prove remunerative, were the seed a good marketable commodity, and fit for the oil press.

"You are aware that our climate at this time of year is exceedingly dry; this has a considerable effect on the state of the flax-stalks, and I have tried a few experiments endeavouring to procure the fibre without the usual process of retting. I send your herewith two specimens of what the people can effect in different ways. They are altogether in the rough, and unheckled. I shall be glad to hear from you what is thought of them, particularly whether the fibre is considered of a good color, and stronger than that which is ordinarily obtained by the retting process. The remainder of the plant weighs 220 lbs., and I hold it at your disposal, should you wish me to send it down to you, as was done with the country produce last year."*

Minute by Mr. Stalkartt.—No. 1. This sample of flax is well grown, of good colour, but harsh and of a coarse fibre, strong but brittle; it is deficient in gloss; this latter is a great point. I do not think it would be of much commercial value, and would recommend Mr. Gubbins to try some improvement on the process of preparation. The great heat of Allyghur, and, perhaps the soil, has probably caused the fibre to be harsh and coarse. We find that the earlier in the season the flax is pulled the better, and it should be pulled when the plant is one-third yellow from the root; after this stage it loses its gloss and is apt to be brittle. I should like to see some of this flax prepared by another process differing but little from Mr. Gubbin's. As the heat has made the plant very brittle, so that it is difficult to crush, let the plant be put one night in the dew to soften, and about 8 o'clock, when the sun has in a measure dried it, let it be gently bruised or bent something like the fingers of the hand, and this process continued till it is well crushed; it must then be scutched and heckled; or if Mr. Gubbins will send a small portion to Calcutta, I will attempt to prepare it for him. I have since heckled one end of this sample, and am of opinion that it is spoiled by over beating in the same place.

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* This straw has been received and forwarded to the Chamber of Commerce at Dundee.

No. 2 looks well, but from the great quantity of bark upon it, till it is heckled, its value is not known. I find that the value of the flax is materially enhanced by putting between small fluted rollers ; by this process the flax is made soft, and a great portion of the bark removed. I find a great quantity of bark upon the sun dried flax prepared by myself, and beg to suggest that the Society bring out a patent dry process flax-cleaning-machine, and that samples of flax straw be obtained from all districts for preparation and report; for with our crude ideas and methods, I think much valuable time and produce is annually lost. I also propose that flax straw from all districts be collected and sent home for chemical analysis. I have since rubbed one end of this sample between my hands, something like the process the washerwomen wash clothes in England, and heckled it. I am from this inclined to think favorably of it, as the above process has wonderfully improved its appearance and softness; it is quite strong enough for all purposes.

April 24th, 1856.

Minute by Mr. Haworth.—I have read Mr. Gubbin's note respecting the cultivation and preparation of the flax, samples of which are now before me. I have also paid due attention to Mr. Stalkartt's report on the same.

On No. 1 specimen, I would give the opinion that I think it has been allowed to ripen too much before pulling, probably with the view of obtaining the seed in as marketable a condition as could be. If pulled before obtaining mature ripeness, it would give better fibre, and the seed would be equally as good if well dried on the ground.

The harsh brittle feel and dull appearance of this sample is much against it; the length is good, and it is stronger than from its appearance I should have expected.

No. 2 sample, is bright in color, fibre of moderate length and strength, and appears to be an article very well adapted for export, as it is neither injured by retting nor by any mechanical operation; and as there is no woody stalk left, there would be no great loss in weight in the further operations required in England; it is in a condition of fine sound flax straw, and ready to receive as much or as little further manipulation as the manufacturer found needful for the particular kind of goods he prepared.

It would be entirely a question of cost of hand labour for stripping, set against expensive machinery required for other methods of preparation, as followed in Europe.

I am strongly of opinion that our first aim should be to produce good seed, and flax *straw* at the same time in this country; people would soon be found either to ship the article as flax straw, or to improve it by the application of machinery placed in central situations.

I am however well satisfied, that if it was brought to market in the condition of Mr. Gubbins's No. 2 sample, and at a moderate cost, it would soon become an article of export to a great extent.

May 28th, 1856.

Minute by Mr. Willis.—On reading the Secretary's letter of April 17th, and Mr. C. Gubbin's letter dated Allyghur, April 4th, 1856, and examining the two several specimens of Allyghur grown flax *(Linum)* marked "No. 1, prepared by beating with a wooden mallet on a bed of sand."

And No. 2, "prepared," as Mr. Gubbins says "according to the mode practised with sunn, *i. e.*, neither wetted nor beaten, but stripped off the stem by the hands."

I think that these specimens, (which I presume to be from Dutch or Riga seed,) sown in Oct. 1855, and gathered and prepared in March, 1856, are rather short in length, being from two feet six inches to three feet; are beautiful in colour, being of a clear and pale golden yellow hue, and apparently of fair strength, but not superior strength; are of moderate flexibility and fineness.

The specimen No. 1, prepared after a novel method of "beating on a bed of sand," seems to me somewhat injured, as it is divested of its natural lustre, from the displacement of it's gummy mucilage, and is somewhat distorted in its fibre; it is deadened and *pro tanto*, weakened. This process of preparation has rendered it less pleasing to the eye, and its marketable value is thereby diminished.

The specimen No. 2, prepared by hand-stripping is excellent of its kind, and is thus (be the difference of expence what it may) presented in a state most appreciable by the manufacturer, the spinner, and the merchant trader: but suitable mechanism in preparation of flax from the straw (fibre and stem) may be successfully introduced from Europe and applied.

Inasmuch as we have seen flax *(Linum)* of much greater length, greater strength, and more flexibility, the colours various as may be from the soils and climates whence produced,—(I allude especially to the European grown kinds, but omit not those meritorious ones, which reached us a couple of years ago from the Punjab), we have to ascribe the defects or deficiencies which are apparent in these specimens to causes which may be capable of complete remedy, or at all events, great amelioration, since we find that there is neither in the soil nor climate of the Doab, any thing which is absolutely uncongenial in the production of flax fibre and its seed.

June 10*th*, 1856.

⁂ A copy of the above reports was sent to Mr. Gubbins, for his information. The following is his acknowledgment of it in a letter from Allyghur, dated 26th June, 1856:—

"I have to thank you for the printed slips and your letter of the 19th June, and for the information they contained. In future, I think, it will be prudent to sow double the ordinary quantity of foreign seed in a given space, as only a proportion of one-half or one-third of the whole quantity sown germinates. *This* was I believe the reason the stems from foreign seed were to a certain extent deficient in thinness and branchy; it was *sown* according to your directions.

" I shall be very glad to repeat the experiment this next season, and *will pull the flax earlier* as recommended by Mr. Stalkartt. Here, however, the plant gets yellow from the topwards, while, from Mr. Stalkartt's expression, I should suppose the plant in Bengal yellowed from the bottom upwards.

" I gather from the remark that the flax of 1854-5 was pulled at a more correct time than that of 1855-6, in regard to the mercantile value of the fibre, and will, at the next ripening, act accordingly, unless you wish it otherwise.

" I intend, besides any experiments with fresh foreign seed which you may recommend this year, to sow the acclimated seed, produced from the foreign imported last year, in order to ascertain how far it may have deteriorated, or whether it preserves its original excellence. This is a point, which if not yet ascertained, it will be well to prove, with a view *to the economy of cultivation,* as I hardly think that flax cultivation would ever prove remunerative on a large scale, were it found necessary to use fresh imported seed for every sowing. But as far as I can judge the climate of our Doab is not favourable for producing clean thin flax fibre; it is far too dry, and the plant requires much watering. All Rohilcund, and our new acquisitions in Oude, are far more damp and moist, and would, I feel no doubt, prove much more congenial for this culture; Jubbulpore is also much more moist, and there I understand the flax plant thrives. But as I mentioned to you some eighteen months ago, the natives even in Rohilcund will not take the trouble of extracting the fibre, unless they can find a ready sale for it at the market. Unless the bunneahs from whom they obtain cash advances will take it off their hands, the flax fibre will to all intents and purposes be to the cultivator an unmarketable produce, and the bunneahs will not purchase till they have received orders for the supply of a given number of maunds.

"This is the same result as attended our endeavours to improve the cotton produced in these parts. The American cotton grew well and gave a good return, but the bunneahs saw no excellence in a finer or a longer staple, and therefore would give no higher price for the new kind, and in consequence the people gradually returned to their old mode of cultivation and their own seed.

"In this there is nothing extraordinary, but it merely examples the ordinary law of demand and supply, and until some agency is organized whereby flax fibre shall be purchased on the spot and transmitted to Calcutta by the purchaser, it will never gain ground in these provinces.

"Were a European to devote himself to such a project, it would be advisable for him to be among the flax fields before the ripening of the seed, and to be able to give instruction to the cultivators as to the mode in which he required the straw or fibre delivered; and only after one or two seasons of purchase could he expect to influence the cultivators, so as to induce them to alter their mode of culture, or the period of pulling, so as to obtain a superior fibre. I pen these remarks in all deference to Mr. Stalkartt's practical experience in the Lower Provinces, but a residence of upwards of a quarter of a century in the country, and a tolerable knowledge of the ways and habits of the people, with the experience of trials, made both by myself and my seniors, has given me data from which results may be very safely predicated. Meanwhile our experiments may throw sufficient light on the subject, to induce some one to embark in this speculation;—any further result it were vain to hope for.

The following is the report from the Dundee Chamber of Commerce on the bale of flax straw forwarded by the Society in 1855, being a portion of the supply sent down by Mr. Gubbins from Allyghur, where it had been grown from *native seed, and after the native fashion, solely for the sake of the seed*:

"Along with this you will receive sample of flax prepared from the last you sent, and you will find a report on other side.

"From this it appears that if proper means as to sowing, growing, and cleaning are taken, India may be a flax producing country, and in order that we may be provided with as much information as possible, could you state at about what price such fibre prepared and ready as the sample, could be shipped from India. Unless it can be laid down here at a certain cost, it could not be used, and I have to mention that the Directors of the Chamber consider that if such flax could be laid down at a price not exceeding £ 35 a ton, it would be useful in the manufactures of this place.

This price refers to this particular sample, if better, more would be got.

DUNDEE: ROBT. STURROCK,
October 11*th*, 1856. *Secretary.*

(COPY OF REPORT.)

"On examination you will find it, I think, to contain considerable promise, there being evidently nothing in the soil or climate of the district in which it was grown opposed to the production of a flax that could be used by spinners generally in this country.

"From the straw having been intrinsically a very poor article, such as the flax steepers in this country would scarcely purchase at all, you will find the quality of the finished sample also indifferent, but nevertheless it is a *marketable article*, and I think good results might follow if another experiment was made, in which more pains was bestowed upon the cultivation."

Report on the comparative value of vegetable seeds from the Government Garden at Ootacamund, in the Neilgherries, with seeds from N. America and the Cape of Good Hope: by Mr. R. Scott, *Head-Gardener, H. C. Botanic Garden, Calcutta (Associate Member).*

(Communicated by Dr. Thomson.)

Herewith is forwarded a report (in tabular form,) on the quality of a dispatch of vegetable seeds received from Mr. McIvor, Ootacamund, on the 20th June last, the produce of the garden there. These seeds have been severely tested, and the results are correctly given in Table A.

Of thirty-six sorts of seed received, five sorts have failed, the failures amount to 13·88 per cent. The maximum, obtained on thirty-one sorts which germinated, is 100 per cent. The minimum is 5 per cent, and the average 51·45 per cent. It will appear from Table A, that a second trial sowing, on the 10th July, was made of several of the sorts where doubts existed as to the correctness of first results. The per-centage entered against these sorts sown a second time is a mean of the results afforded by the sowing in June and that in July. The failures entered occurred in both trials.*

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* Mr. Scott's report on these seeds is much more satisfactory than those received from other quarters. In the Society's garden they proved almost a total failoure; and in the Berhampore arden only 12 of 35 kinds vegetated. This may probably be accounted for, from the fact that the batch on which Mr. Scott has reported was received and sown before the setting in of the rainy season; whereas those sent to the Society by Mr. McIvor, were not received till the middle of August, and,—with the exception of the packets transferred for trial in the Society's garden, and Barrackpore Park garden,—the majority were again subjected to the disadvantage arising from long journies by dâk banghy at the worst period of the year.—Eds.

Further, I have endeavoured to reach an approximation of the value of the Ootacamund seed as compared with American and the Cape of Good Hope seed, and in order to do so have gone back to 1850, which I prefer to receipts of recent years; the vegetable seed of 1850 from America and the Cape of Good Hope, were tried with nearly equal results in this garden, and in the Horticultural Society's garden, and copy of these results was placed, at the time, in the hands of the Secretary to the Agricultural and Horticultural Society, and may be available as a check on my calculations.

The original table, in my possession for 1850, contains in the American column 16 sorts of vegetable seed bearing the popular names—beet, cabbage, carrot, celery, lettuce, radish and turnip; each of these names occurs in the Cape of Good Hope column of table for 1850 to the number of 14 sorts, and on the accompanying table, A, there are 27 similar sorts from Ootacamund, this year. These numbers, namely 16, 14, and 27, include the whole of the sorts of beet, cabbage, carrot, celery, lettuce, radish, and turnip seed, respectively received as shown in detail, table B, appended to table A.

The disparity in the adjective portion of the names of the seed thus brought together, for comparison as to quality, is in my opinion (even if it could be avoided) a matter of little moment.

Table C shows as nearly as can be reached the comparative value of American, Cape of Good Hope, and Ootacamund seed. The facts brought out in this table speak for themselves.

H. C. Botanic Garden,
Aug. 11*th*, 1856.

TABLE A.

Showing the results of trial sowings of vegetable seeds received on the 20th June, 1856, from Mr. McIVOR, *Ootacamund Gardens.*

Nos.	Names.	Date of sowing	Date of germination	Percentage obtained.	Remarks.
1	Cabbage, Sutton's Imperial, ...	23-6-56	1-7-56	85	A first trial sowing of all from No. 1 to 36 inclusive was made on the 23rd of June, in some instances the results were not of a reliable nature. The percentage entered against those sorts sown a second time (on the 10th July) is a mean of results afforded by the sowing in June and that in July. The failures entered occurred in both trials.
2	„ small early cattle,	„	„	55	
3	„ early York, ..	„	„	80	
4	„ thousand headed,	10-7-56	24-7-56	00	
5	„ select large drum-head, ...	23-6-56	1-7-56	80	
6	„ early Coombe, ..	„	„	20	
7	Brocoli, Hammond's white Cape, ..	„	28-6-56	45	
8	„ purple Cape, ..	„	„	70	
9	Celery, white giant,	10-7-56	24-7-56	20	
10	Mustard, white, ..	23-6-56	28-6-56	70	
11	Beet, white Silesia sugar, ...	„	„	55	
12	„ red large crimson,	„	„	35	
13	„ Sutton's dark red,	„	1-7-56	45	
14	Spinach, mixed, ..	10-7-56	24-7-56	5	
15	Radish, Beck's short top, ...	23-6-56	28-6-56	75	
16	„ Scarlet, olive shaped, ...	„	„	25	
17	„ mixed turnip, ..	„	„	45	
18	Tomato, yellow, double, ...	„	„	75	
19	„ red double, ..	„	„	60	
20	Carrot, James' orange	10-7-56	24-7-56	15	
21	„ orange Belgian,	„	„	10	
22	„ large white Belgian, ...	„	„	00	
23	„ Altringham, ..	„	„	10	
24	Nole-kole, large green, ...	23-6-56	1-7-56	45	No. 24 is entered as one sort in the number of Cabbage table B, as it is included in the American and Cape seed of 1850.
25	„ early green, ..	„	„	35	
26	„ purple, ...	10-7-56	24-7-56	00	
27	Turnip, early six weeks, ...	23-6-56	28-6-56	85	
28	„ select orange, ..	„	„	100	
29	„ imperial green globe, ...	„	„	100	
30	„ green top six weeks	„	„	85	
31	„ Lincolnshire new and globe, ..	„	„	60	
32	„ new red top, white mansetail, ..	„	„	70	
33	Cress, curled, ...	„	1-7-56	25	
34	Lettuce, Bath cos., ..	10-7-56	24-7-56	00	
35	„ white cos., ...	„	„	10	
36	„ white cabbage, ..	„	„	00	

H. C. BOT. GARDEN, CALCUTTA. R. SCOTT.

TABLE B.

Shews in detail the materials on which Table C is based.

American seed of 1850.				*Cape of Good Hope seed of* 1850.				*Ootacamund seed of* 1856.			
Number of sorts of seed received.	Number of sorts of seed which failed.	Names.	Aggregate per centage obtained.	Number of sorts of seed received.	Number of sorts of seed which failed.	Names.	Aggregate per centage obtained.	Number of sorts of seed received.	Number of sorts of seed which failed.	Names.	Aggregate per centage obtained.
1	0	Beet.	99	1	0	Beet,	78	3	0	Beet,	135
5	0	Cabbage,	296	6	0	Cabbage,	350	7	1	Cabbage,	365
2	1	Carrot,	46	1	0	Carrot,	56	4	1	Carrot,	35
2	2	Celery,	00	1	0	Celery,	29	1	0	Celery,	20
2	1	Lettuce,	13	1	0	Lettuce,	28	3	2	Lettuce,	10
2	0	Radish,	130	2	0	Radish,	86	3	0	Radish,	145
2	0	Turnip.	166	2	0	Turnip.	79	6	0	Turnip.	500
16	4		750	14	0		706	27	4		1210

HON. CO.'S BOT. GARDEN,
CALCUTTA.

R. SCOTT.

TABLE C.

Shewing the comparative value of American, Cape of Good Hope, and Ootacamund vegetable seeds.

From whence received, year of receipt, and months in which trial sowings were made.	Number of sorts of seed received.	Number of sorts of seed which failed.	Amount of failures in per-centage.	Maximum per cent obtained on sorts which germinated.	Minimum per cent obtained on sorts which germinated.	Average per cent obtained on sorts which germinated.	Amount of loss per cent on sorts which germinated.
America, 1850, August and September, Ootacamund, 1856, June and July.	16	4	25	99	13	62·5	37·5
	14	0	00	88	11	50·428	49·572
	27	4	14·814	100	10	52·608	47·392

HON. CO.'S BOT. GARDEN,
CALCUTTA.

R. SCOTT.

Report on trial sowings of vegetable seeds received from North America, the Cape of Good Hope, and Scotland: by Mr. R. Scott, *Head-Gardener, H. C. Botanic Garden.*

(Communicated by Dr. Thomson.)

I enclose herewith three lists of vegetable seed received in 1856, on the respective dates attached, from the Agricultural and Horticultural Society of India: on each of the lists is a table showing the results obtained from a trial sowing of the seeds. Appended, on a separate half sheet, is a fourth table, in which the results of the respective trial sowings are brought together for comparison. The quality of the seed at the time of these trial sowings were made, may, on the whole, be considered satisfactory,

I must however, remark that in October and November, when the seeds were laid down for a general crop, I found a majority of the American and Cape seeds considerably under the value obtained from my trial sowings; I anticipated this result, having on the 19th October examined the American and Cape seeds intended for sowing on the following day, for general crop, and observed that a slight loss in weight had been sustained, the reduction, though but fractional, was sensible. I then selected a few seed of the largest kinds, as peas, radish, &c., and laid several of the seed open, entering my knife so as to cut the integument all round where the edges of the cotyledon meet, portions of several of the seed thus laid open were placed under a microscope, and the existence of mycelium on the flat and convex sides of the cotyledons, and upon the embryo, was plainly visible. I state these facts without attempting, at present, to draw from them conclusions; at the same time I should be glad to hear in how far my observations may be confirmed or otherwise, by what has passed under the notice of other Members of the Society interested in the matter.

I may add that I find several of the cabbages raised from Cape seed incorrect to name. The "acclimated" cauliflower has been found worthless for table purposes.

Botanic Garden:
January 8th, 1856.

List of American vegetable seeds received from the Agricultural and Horticultural Society of India on the 28th August, 1856.

		Date of sowing.	Date of germinating.	Per-centage
1	Artichoke, long globe,	29-8-56	9-9-56	5
2	Asparagus, large purple top, ...	„	20-9-56	30
3	Beet, long blood red,	„	4-9-56	80
4	Brocoli, early white,	„	„	60
5	Bean, French red, .	„	2-9-56	85
6	„ scarlet runner,	„	11-9-56	00
7	„ Lima, ...	„	4-9-56	15
8	„ long pod, ..	„	11-9-56	5
9	Carrot, long orange,	„	9-9-56	35
10	„ early horn, ..	„	„	10
11	Cabbage, early sugar loaf, ...	„	4-9-56	65
12	„ „ York, ..	„	„	20
13	„ „ Battersea,	„	„	65
14	„ red Dutch, ..	„	„	70
15	„ turnip-rooted,	„	„	50
16	Cauliflower, late, ..	„	„	70
17	„ early Asiatic,..	„	„	75
18	Celery, white solid...	„	20-9-56	15
19	„ red solid, ..	„	„	00
20	Cucumber, early frame,	„	2-9-56	90
21	Corn, yellow orange,	„	4-9-56	25
22	„ white gourd, ..	„	„	30
23	Lettuce, royal cabbage,	„	11-9-56	10
24	„ broom Dutch, .	„	4-9-56	45
25	„ white cos, ..	„	11-9-56	00
26	Leek, London,.. ..	„	20-9-56	5
27	Melon, citron, . ..	„	2-9-56	95
28	„ sweet water, ..	„	11-9-56	00
29	Onion, large Strasburgh	„	9-9-56	5
30	Parsley, curled, . ..	„	20-9-56	25
31	Pea, dwarf marrow fat,	„	4-9-56	55
32	Pea, Knight's tall marrow fat, ...	„	16-9-56	00
33 34	„ imperial blue Prussian, ...	„	9-9-56	10
	„ tall sugar, ..	„	16-9-56	00

List of American vegetable seeds received from the Agricultural and Horticultural Society of India on the 28th August, 1856.—(Continued.)

		Date of sowing.	Date of germinating.	Per centage.
35	Pea, blue Prussian,	29-8-56	4-9-56	75
36	Radish, white turnip,	„	2-9-56	75
37	„ red turnip, ..	„	„	55
38	Squash, early bush, .	„	4-9-56	10
39	„ Lima,	„	16-9-56	00
40	„ Marrow, ..	„	„	00
41	Turnip, Aberdeen yellow, ...	„	2-9-56	70
42	„ white flat, ..	„	„	80
43	Tomato, red large, .	„	4-9-56	70

Botanic Garden, Calcutta,
January 7, 1857 R. Scott.

List of Cape of Good Hope vegetable seeds received from the Agricultural and Horticultural Society of India, on the 28*th August,* 1856.

		Date of sowing.	Date of germinating.	Per centage.
1	Artichoke,..	29-8-56	9-9-56	5
2	Asparagus, ...	„	20-9-56	5
3	Beet, red, ...	„	4-9-56	95
4	Brocoli, ...	„	„	80
5	Bean, broad, ..	„	11-9-56	15
6	„ French, .. .	„	2-9-56	35
7	Carrot, . .	„	9-9-56	50
8	„ orange,	„	20-9-56	15
9	Cabbage, sugar loaf,	„	4-9-56	60
10	„ drumhead, ..	„	„	80
11	„ York, ...	„	„	50
12	„ early, ..	„	„	70
13	„ Savoy, ..	„	„	55
14	„ turnip-rooted,	„	„	65
15	Cauliflower, .. .	„	„	40
16	„ acclimated, ..	„	„	40

List of Cape of Good Hope vegetable seeds received from the Agricultural and Horticultural Society of India, on the 28th August, 1856.—*(Continued.)*

		Date of sowing.	Date of germinating.	Per centage.
17	Celery, ...	29-8-56	20-9-56	20
18	Cucumber, ...	,,	2-9-56	85
19	Endive, ...	,,	4-9-56	30
20	Lettuce, cabbage, ..	,,	,,	40
21	Leek, ...	,,	20-9-56	10
22	Melon, ...	,,	4-9-56	95
23	Onion, ...	,,	9-9-56	10
24	Parsley, ...	,,	20-9-56	10
25	Parsnip, ...	,,	,,	10
26	Peas, early marrow fat,	,,	4-9.56	90
27	,, marrow fat, ..	,,	,,	90
28	,, early field, ..	,,	,,	90
29	,, imperial blue Prussian, ...	,,	,,	50
30	Radish, ...	,,	2-9-56	45
31	Spinage, ...	,,	9-9-56	15
32	Turnip, ...	,,	2-9-56	95
33	,, early, ...	,,	,,	70

BOTANIC GARDEN, CALCUTTA :

January 7, 1857. R. SCOTT.

List of Scotch vegetable seeds received from the Agricultural and Horticultural Society of India on the 15*th September*, 1856.

		Date of sowing.	Date of germinating.	Per centage.
1	Artichoke, green, ..	16-9-56	2-10-56	5
2	Asparagus, giant, ..	,,	,,	10
3	Beet, crimson, ..	,,	20-9-56	65
4	Basil, sweet, ...	,,	2-10-56	15
5	Balm, ...	,,	,,	1
6	Brussels sprouts, ..	,,	24-9-56	60
7	Brocoli, Chappel's, ..	,,	20-9-56	40
8	,, late white, ..	,,	,,	35
9	,, spring	,,	2-10-56	00
10	,, Grange's, ..	,,	20-9-56	35

List of Scotch vegetable seeds received from the Agricultural and Horticultural Society of India on the 15th September, 1856. (Continued.)

		Date of sowing.	Date of germinating.	Per centage.
11	Bean Windsor, ..	16-9-56	28-9-56	20
12	,, dwarf white kidney, ...	,,	20-9-56	00
13	Cabbage, emperor, ..	,,	24-9-56	45
14	,, dwarf, ...	,,	2-10-56	00
15	,, drumhead, ..	,,	24-9-56	10
16	Cauliflower, . ..	,,	,,	15
17	Celery, white solid,..	,,	2-10-56	00
18	,, red, ...	,,	,,	00
19	Cardoons, Spanish,..	,,	24-9-56	10
20	Cucumber, ...	,,	20-9-56	10
21	Cress, curled, ...	,,	,,	00
22	Endive, ...	,,	28-9-56	20
23	Fennel, ...	,,	2-10-56	5
24	Kohl Rabbi, . ..	,,	24-9-56	10
25	Kohl Rabbi, early purple, ...	,,	2-10-56	00
26	Kale	,,	,,	00
27	Lettuce, ...	,,	,,	10
28	Leek, Scotch, ...	,,	,,	00
29	Lavender, ...	,,	,,	00
30	Mustard, white, ..	,,	20-9-56	65
31	Marjoram, sweet, .	,,	2-10-56	00
32	Melon, green, ...	,,	20-9-56	60
33	Onion, Strasburgh,	,,	2-10-56	00
34	,, Spanish white,	,,	,,	5
35	,, blood red, ..	,,	,,	00
36	Parsnip, ...	,,	,,	00
37	Peas, Bishop's longpod,	,,	20-9-56	65
38	,, blue scimitar,	,,	,,	80
39	,, early Emperor,	,,	,,	50
40	,, Daniel O'Rourke,	,,	,,	80
41	Radish, turnip, ..	,,	24-9-56	20
42	Salsafy, ...	,,	2-10-56	10
43	Scarzonera, ...	,,	,,	15
44	Savoy, curled, . ..	,,	24-9-56	20
45	Spinage, round, ..	,,	2-10-56	00
46	Turnip, Dutch white,	,,	20-9-56	80
47	,, Orange, ...	,,	,,	80
48	Vegetable marrow, ..	,,	,,	25

Botanic Garden, Calcutta,
January 7, 1857.

R. Scott.

TABLE

Showing the relative value of American, Cape of Good Hope, and Scotch vegetable seeds of* 1856, *received from the Agricultural and Horticultural Society of India.

	Number of sorts of seed received.	Number of sorts of seed which failed.	Per centage amount of failures.	Maximum per cent obtained on sorts which germinated.	Minimum per cent obtained on sorts which germinated.	Average per cent obtained on sorts which germinated.	Amount of loss per cent on sorts which germinated.
America, ...	43	8	18.6	95	5	45.28	54.72
Cape of Good Hope. ..	33	none	none	95	5	48.93	51.07
Scotland, ...	48	15	31.25	80	1	32.6	67.4

BOTANIC GARDEN, CALCUTTA:
January 7, 1857.

R. SCOTT.

Remarks on the improvement of silk-worms. By Capt. Thomas Hutton, F. G. S.

[The following remarks have been addressed to Mr. Bashford in reference to his experiments at cross-breeding the silk-worm of Bengal with Europe stock, as detailed in a previous paper. A few notes have been appended by Mr. Bashford in forwarding this communication to the Society for publication in the Journal.]

In reply to your inquiries, I have to state that *Bombyx Huttoni* cannot be treated like the domestic kinds, but must (at least for the present) be reared *upon the trees.*

Your experience with this species exactly tallies with my own; the worms will not remain in the trays, nor even upon twigs placed in water, when once the freshness of the leaf is gone. On the tree it is perfectly free from restlessness, and saves a vast expense in feeding, besides possessing the advantage of always having perfectly fresh food at command, an essential point in forming good silk, as the quality of this substance must always be greatly influenced by the healthy secretions of the animals producing it.

Hence, where the food cannot be readily supplied and kept fresh, the silk will unavoidably degenerate, because the health of the animals will be affected thereby, and this, by the artificial method of cultivating now practised must always be more or less the case, seeing that the juices of the leaf begin to ferment and decay soon after being plucked from the tree.

Cocoons of *Bombyx Huttoni* produced in the house from worms placed upon small branches set in jars of water to keep them fresh, are always inferior to those produced upon the trees, and I doubt not you would find this to be the case with the domestic species in Bengal.

I am of opinion, therefore, that if any radical change for the better can be effected among your worms, it will be by the introduction of an improved, and more natural method of feeding, *and not by crossing.*

I say this with reference to your interesting paper detailing your experiments, a copy of which, through the kindness of Mr. Blechynden, has just reached me, and as I find therein that you seek the opinion of naturalists as to whether you will ever be able permanently to improve the Bengal worms, I readily come forward to record my own opinion as founded upon some little experience and observation in Natural History. If you cross an imported English greyhound with the common village cur, or pariah dog of India, the pups will partake of the characteristics of both parents. Cross one-half of these pups with fresh greyhound blood through successive litters, and the produce will at last exhibit the characters of the greyhound only, but if you then allow the last batch of pups to breed successively *inter se*, you will be surprised to find that the pariah will again gradually appear.

Secondly,—cross the remaining pups of the first batch with pariah blood through successive generations, and then permit the produce to breed *inter se* as before, and all will permanently remain pariahs.

This, in the case of the first experiment, would be termed *degeneration*, but it is really not so, the reason being simply this, that nature abhors all crosses and confusion of species, and invariably makes strenuous efforts to return to the primitive stock; hence the necessity in the breeding of cattle &c., for occasionally renewing the blood, and keeping up to the desired standard.

Now in the case of greyhound and pariah, the former is an artificial species composed of crosses, while the latter is in a state of nature; and the natural being always stronger than the artificial constitution, will eventually prevail, unless the particular standard required be kept up by occasional fresh crosses.

This appears to be precisely what you have found with your crosses on the Bengal silk-worms, with this difference only, that you have experimented with natural species on both sides. But then you have recorded that the French species "displayed a better constitution, and more hardy nature than the country worms," and hence the strongest constitution has prevailed, and will, I imagine, always do so, carry out the crossing as you may; and if once you may cease to cross with the Bengal worms, you will find that the stock already produced will always have a tendency to become *annuals.*

My opinion, then, is that *no permanent good result can be obtained by crossing.*

You say you "have every belief in the possibility of improving the Bengal silk-worms under a better system of management, and have no doubt those of Europe have only acquired their present perfection by care and tuition"; adding that "the superb cocoons seen by you at the late French Exhibition were a proof of what art and careful management can produce." In these opinions I can only partially concur.

Your argument would tend to show that the species were the same, and had been improved in France by good management, which is not the case as regards the white cocoon, that being totally distinct from the yellow cocoon of Bengal, while even the superiority of the French yellow cocoons is probably more dependent upon climate, than upon the treatment of the worms.

As to the possibility of improving the Bengal silk-worms under a better system of management, I fully agree with you; but then, I think such improvement must be effected by seeking a climate more favourable to the health of the insect, and by the introduction of a more natural system of feeding it.

That good management, even under the present artificial system, will always produce cocoons superior to those which are carelessly reared, there is no denying; but I do not attribute the superiority of French cocoons so much to such judicious treatment as to the circumstance that the insect is itself in the one instance superior to, and distinct from, those of Bengal, while in the other, the climate in which it is reared probably more nearly approaches to that of the country from which the worm was originally procured, than does the climate of Bengal.

In such case, too, the mulberry would probably yield a more healthy and nutritious food than those in Bengal, especially since the system of repeatedly cutting down the bushes in the latter country, cannot fail to injure the plant.

That a proper selection of climate may have a great influence upon the worms, is fully proved by the curious fact, that *annuals* sent to me from Bengal, under the name of "*Italian stock,*" and producing a pure white cocoon, have yielded *two crops* within the year at Mussooree;—thus teaching us that we should not rest satisfied with the mere knowledge that the worms originally came from China, but should ascertain in what particular districts of China, they are indigenous, in order that we may seek for similar climates in India for their successful cultivation.

The fact of two crops of silk having been obtained within the year from a species which, whether cultivated in France, Italy, or Bengal, has hitherto been regarded as an annual, would tend to show not only the superiority of our climate over those of the above-mentioned countries, but likewise that the insect originally came from a Chinese district, possessing a climate somewhat similar to that of Mussooree, where the occurrence of numerous Chinese forms among our insects, would serve to mark it out as a decidedly good locality for silk growing, and that fair trials ought accordingly to be made.

To expect great results in Bengal from insects belonging naturally to colder regions, or the products of Bengal in more Northern districts, is to set nature at defiance, and act against those rules which common sense would dictate as correct.

You may say that you cannot in Bengal, expose your insects upon the trees, as I do those of *Bombyx Huttoni,* and that many would be destroyed by the constantly changing temperature, as well as by birds and bats, but such admission would at once declare that Bengal was not the climate best adapted to the species, for in a state of nature the worms must most undoubtedly have originally been found exposed upon the trees, while the loss arising from the depredations of birds and bats, would probably in a well watched plantation be considerably less than that now occurring from sickness in the breeding-houses, and which, most probably, in a state of nature, would entirely disappear.

The inferiority of cocoons reared in Syria to those of France is, I imagine, if the species is the same, to be attributed to the fact of the climate being too like that of Bengal, and therefore more widely differing from the original habitat than does the climate of France.

That all our species were at one time to be found in a state of nature, I feel fully convinced, although I do not quite agree with you that they fed "upon all sorts of leaves," and have been trained to feed upon the mulberry as best adapted to the production of good silk. Experiments have frequently been made, both in France and Italy, with a view of inducing the worms to partake of other food, and more particularly in districts where the mulberry is expensive or too delicate to thrive well, but hitherto without success; and this of itself goes far to prove that nature and not art has assigned that tree to the sustenance of what are now domestic species.

It does not follow, however, that because we have hitherto failed, there may not yet be found some substitute for the mulberry, and I had great hopes that I had made such a discovery in regard to *Bombyx Huttoni,** a number of cocoons having been procured, last summer, from *a wild fig tree,* in the neighbourhood of which there was no mulberry from which the worms could have dropped, or wandered. They must, consequently, have fed upon the leaves, and there spun their cocoons; and yet strange to say, I could never induce the worms of that species to touch the leaves, although on one occasion, when my usual supply of mulberry leaves was for a day or two interrupted by bad weather, I induced the worms of your *Dasee* breed *to eat them.*

I did not, however, pursue the experiment, when mulberry leaves were again procurable, because I was unwilling to risk the lives of the few worms then in my possession. Suffice it for the present to say that they fed upon the fig leaves, although the mulberry was infinitely more palatable and preferred.

We have, then, from these facts some reason for believing that a substitute for the mulberry may yet be found, or at all events that there are plants which may, in times when the mulberry leaf is scarce, be made available for keeping the worms alive.

After all perhaps, it is not very wonderful that the worms fed upon the fig leaves, when we call to mind that in Assam there is said to be a species of *Bombyx* feeding upon the *Ficus religiosa,* and another in Bengal upon the *Artocarpus.*

It would appear, then, from the preceding remarks, that if the Bengal species of silk-worms are to be improved, such improvement must proceed less from the crossing of species, than from the selection of localities better suited to the health and constitution of the insects than the climate of Bengal, a point that can easily be ascertained by carefully recorded experiments carried on in various parts of the country, and upon which the assistance of a liberal and enlightened Government would be well bestowed.

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* I am not sure that it *is not* the case, but further experiment is required.

MUSSOOREE:
January 29th, 1857.

Notes by Mr. Bashford.

Capt. Hutton seems to have a fixed idea that Mussooree, or its climate, is the right locality for silk, and the worm in its wild state running loose on the tree, the proper state to produce good silk; he would abolish cultivation, art, and every thing that the united efforts of centuries have brought to such perfection in Europe.

I cannot agree with him, and I do not think any one else will; if China is the mother country of silk, as tradition says, and the worms in Europe originally imported from that country, then why are they now so superior in Europe to those in China? Care, cultivation, and art are availed of in every particular of the worm's career; even incubation is arranged by art to suit the mulberry leaf in Europe.

I do not know to what worm Capt. Hutton alludes, as having been sent by you, and its hatching with him twice in the year in opposition to its habit in Bengal.* I fancy it would be our *Boro Poloo*, or what we term annual; if the Radnagore species, I do not know its origin, but if north of Calcutta, most likely it was originally Italian. It is a very common thing for a few eggs of all annual worms, even in Europe, to hatch a few weeks after being deposited, but so few in number as not to be worth attention, and in cold climates, they have no second crop of mulberry leaf for them.

Capt. Hutton's remarks would point to Bengal as a climate not suited to the silk-worms, whereas it is the most appropriate, and most bountifully provisioned of any country under the sun, and with greater care in the rearing of worms and treating the cocoons, it would be second to no country in the quality of its silk.

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* The eggs sent to Capt. Hutton were those of the *Boro Poloo*, known as the annual or Italian worm; they were obtained from the district of Moorshedabad.—A. H. B.

Look at our breeding establishments in England, horses, fowls, sheep, &c., &c.; every thing is most successfully crossed, and the improvements are permanent.

If I had thought your Journal would have been kept back so long, I would have continued my narrative on crossing, and would have reported more success than my labors had met with up to the date of my published experiments; Sept. 15th, 1856.

SURDAH,
Feby. 15*th*, 1857.

THE INDIGENOUS PLANTS OF BENGAL.

Notes on peculiarities in their structure, functions, use in medicine, domestic life, arts and agriculture: by the Rev. J. LONG.

The object of the writer of this, is to draw attention to the native plants of Bengal, in the hope that they may be employed to a greater extent for medicinal and other purposes. The works of Royle, Roxburgh, and many other writers, Native and European, containing various notices of native plants, have been freely used.

EXOGENS, OR OUTWARD GROWERS.

Plants having pith, wood and bark, with new layers of wood on the outside of the old, leaves with netshaped veins.

1st SUB-DIVISION.—THALAMIFLORÆ.

Parts of flower mostly in five divisions; coverings of the flower double; stamens inserted under the seed vessels:—

1. RANUNCULACEÆ.—This order is abundant in Indian highlands; they are called "Crow Foots", because their leaves are shaped like a crow's foot; they are acrid.

Chágal Báti (Naravelia Zeylanica).—A climber found in hedges; the seeds are tailed; the root tuberose. Fl. RS. In India. Flowers handsome, but juice acrid.

2. DILLENIACEÆ.—Beautiful trees with alternate rough leaves; Australia their head-quarters; astringent.

Chálitá (Dillenia speciosa).—A native of the Hill forests, said by Roxburgh to be, "when in flower, one of the handsomest flowers I have seen." It is much prized in English hot-houses. The branches at the top form a beautiful, shady, spreading crown. The flowers are very fragrant, nine inches in diameter; the anthers bend out under the stigma, and form a large yellow globe in the centre, having the stigma bent back, and opening by two pores at the top. The flower-stalks are club-shaped. Fl. RS. The veins of the leaves are parallel and elevated, corresponding in number with, and ending in the margins of the leaves, shaped like the teeth of a saw; the leaves being very rough, are used for polishing. The leaf-stalks are channelled, and leave a permanent mark after they fall. The wood, being hard and tough, is used for gun-stocks. The fleshy leaflets of the calyx are used by natives to make curries or lemonade; they are fond of the fruit also. The seeds are very hairy, and are immersed in a gelatinous pulp. The wild elephants in Asam are very fond of the fruit, which appears in February.

3. MAGNOLIACEÆ, *or Pride of America*—where they abound in the swamps; a few found in Khasia and Nepal; bitter but aromatic: the stipules or leaf-stalk scales, when young, are rolled together to enclose the next leaf that is to be unfolded, as in the fig *genus* they soon fall off; leaves alternate.

Champá (Michelia champaca).—Famed for its fragrant yellow flowers, used by the natives in festivals, &c. The bees never light on its blossoms, owing to their strong aromatic scent. Indian women are fond of having them in their hair. Its Sanskrit names are—*subhag*, pleasing to the eyes, and *hempushpa* golden-flowered, a name also given to the *Asoka*, China rose, maddar. The leaves are lance-shaped and waved; the leaf-stalks are marked on the upper margin with the scars of the stipules. The calyx is a conical, leathery sheath, bursting on one side, and falling off before the flowers expand. Fl. RS. The seeds destroy vermin. The sepals and petals are colored, and fall off. The bark of the root is used medicinally.

4. Anonaceæ, *or Custard Apple Tribe.*—Trees or climbers, with alternate leaves. The innermost coat of the seed forms several plaits that enter the albumen.

Átá (Anona squamosa.)—A native of South America. It is remarkable that this plant, like the tobacco (*támrakuta,*) has Sanskrit names *sitaphal,* and *gandagátra,* "whose inside is like boils," yet is not indigenous to India; it grows wild, however, over many parts of the Deccan. The leaves are oblong and blunt, and have a heavy, disagreeable smell. The seeds contain a highly acrid principle, fatal to insects; used by Hindoos, powdered and mixed with the flour of gram, for occasionally washing their hair. The fruit has, in some famines in India, proved the staff of life. When cultivated and pruned, during the hot season, it produces fruit afterwards of double the usual size. Fl. HS.

Noná (Anona reticulata).—Bullock's heart, so called from a fancied resemblance. Its native seat is the West Indies. It was brought to Asia viâ Philippines from South America, where its fruit is a great favorite among the Spaniards. The leaves are lance-shaped. The seeds may be swallowed whole with impunity, though the kernels are highly poisonous. Its bark is used for ropes; it is a powerful astringent, and a tonic much used in medicine by the Malays and Chinese. The fruit is much coveted by the gardener's enemies, bats, squirrels and monkeys. Fl. HS. The flowers have the fragrance of ripe apples. Sanskrit name *átripea,* pleasing.

Debdári (Guetteria longifolia).—Mast tree. The leaves are lance-shaped, waved, shining. Birds eat the fruit. The wood is white; pencils and boxes are made of it, and, in China matches. Boys play with the seeds. Fl. HS. A native of South India. The *Barachâli* belongs to the same genus.

5. Menispermæ, *or Cocculus Tribe.*—Twining shrubs. Roots bitter : seeds narcotic. The seeds of one kind are used for adulterating beer, and poisoning fishes : the stamens are not on the same flowers as the pistils.

Gulancha (Tinospora cordifolia).—A very common wild plant, climbs over the highest trees. The bark is corky, with many elevated rough specks. From the branches fibres often drop, which, as in the peepul, lengthen till they enter the ground, and form fresh stems, sometimes thirty feet long. Leaves five-nerved. The red berries are eaten by birds. The natives use a decoction of the root, stem, and leaves, in fevers. From fifteen to twenty grains of the powdered root are a good emetic. Its Sanskrit name is *amrita*, the immortal.

6. Nymphæaceæ, *Water Lilies.*—Botanists have had much discussion whether these are exogens or endogens. The roots are used for food. Similar to arrow-root, the seeds are eaten. The bitter, astringent stems are used for food. These "ladies of the lake" are beautiful objects on tanks in Bengal—

> Crowning the depths, as with the light serene
> Of a pure heart.

Bara shâluk (Nymphæa pubescens).—Found in every part of India. The margins of the leaves are sinuate, *i. e.*, bend in and out, toothed, downy underneath. The berries have twenty cells. The flowers are white, and have a vinous smell. There is another, variety with pink flowers. The *chota shaluk, nilpadma (or Nymphæa stellata)*, has blue flowers and oval leaves.

Bara rakta kambul (Nymphæa rubra).—Has from twenty to twenty-five stamens, and from twelve to fifteen rays in the stigma. Medicine from its root is used in measles. Its Sanskrit name is *hallaka*, the delighter—

> "The sacred flowers that crown
> The lakelet with their roseate beauty."

Its flower-stalk is used by natives in games. Fl. HS. and RS. The *Chota raktakambal (or Nymphœa rosœa)* has a rose-coloured flower.

Bara shandi (Nymphœa versicolor)—Has leaves shield-shaped, the posterior lobes of the margin overlap each other. The flowers are azure.

Chhota Shandhi (Nymphœa edulis).—The rays of the stigma, ten to fifteen, bend inward. The berry is the size of a large nutmeg. The under-ground stems, or roots, are used by natives both as food and medicine. The flowers are very white, hence its Sanskrit names *kahlár*, the necklace of the water—hence a name of the moon is *kumudbandhu*, or a friend to this lily, which expands its petals to the moon's rays, but closes them in the day.

Padma (Nelumbium speciosum).—Its flowers are beautiful, but inodorous; they are used in Hindu ceremonies to place at the foot of the idol. The Chinese in summer serve the roots up with ice, and store them up for winter in salt and vinegar. The root creeps in the mud, is jointed at various distances, has many pores; the joints in old plants often swell into tubulosities as large as a man's fist, from them issue leaves and flowers. The corolla has from fifteen to sixty petals. The anthers are linear, *i. e.*, have the two sides parallel, and are crowned with a white pearl-colored club. The stigmas are funnel-shaped. The leaves are radical, have underneath innumerable small vesicles, which render the leaves specifically lighter than water, they have from fifteen to thirty nerves, and are used as plates. The leaf-stalks are very long, and are armed with prickles. This plant was formerly found in Egypt, but is now extinct there. The seeds will keep forty years, and then vegetate. Snakes nestle in this lotus. The spiral vessels serve as wicks in temples. The Hindus compare a beautiful woman to this lily. Its Sanskrit names are *sitámbhoj,* the fair daughter of the water —*pangkaja,* offspring of the mud.

7. PAPAVARACEÆ, *Narcotics.*—The poppy tribe. Oil of the seeds used instead of olive oil. Opium is the juice of the poppy.

Sheálkántá (Argemone Mexicana, or Mexican Thistle).—Introduced into India three centuries ago from Mexico, it is now a common weed by the road sides throughout India. It was brought to England from Mexico, A. D. 1590, where its juice was used as an emollient in inflammation of the eyes. The whole plant is covered with strong prickles, hence the Spaniards called it *fico del inferno*—the fig of hell. The leaves, wrinkled and curved up at the margin, are bluish green, striped with white, and prickly. The calyx is prickly, and the bright yellow flower has a purple pistil in the centre, the stigmas forming a kind of cross at the top. The seeds are kidney-shaped and striped, when smoked with tobacco, narcotic; they yield an oil used for lamps in the Concan, and for the head when aching from exposure to the sun, applied also in cases of itch. In Jamaica and the West Indies, they are used as an emetic, a thimble-full being bruised with water, and given to drink: it is called there the golden thistle of Peru. The stem and leaves, when bruised, give out a thick glutinous yellow juice, used in ophthalmic cases. Fl. RS. The fresh root, bruised and applied to the part stung by a scorpion, is said to afford relief.

8. CRUCIFERÆ, *Cabbage Tribe*—called *cruciferæ* from their petals being four in number, shaped like a cross. There are more than 1,000 species in this order, but only a few are indigenous to the plains of India. They are stimulant and acrid, but cultivation diminishes this as in the case of the Night Shade tribe; contain sulphur and nitrogen, hence their animal odor when rotting. All are herbaceous.

Sarsheá (Sinapis dichotoma).—Mustard, conspicuous for its handsome yellow flower. Sown in November, the ripe seed gathered in February. The stem is dichotomous, *i. e.*, ramifies in pairs: the lower leaves have the shape of a lyre, and are white, the upper ones are triangular shaped. There are various species, as the *svet rái, bara rái, ban rái, bil rái*—all cultivated for the oil of their seeds.

Mulá (*Raphanus sativus*). *Radish.*—The root grows to the size of a man's leg; the seeds vegetate very rapidly; gives a good oil.

9. Capparideœ, *or Pungent Flower Buds.*

Hurhuriyá (*Polanisia icosandra*).—Stem hairy, and glutinous; leaves finger-shaped; lower leaflets five from the same point; uppermost three; seeds have a net-shaped surface, used by natives for curries, and in Cochin China, instead of a mustard plaster. The stamens are of various lengths, the flowers appear in succession. The anthers, after bursting their tops are rolled back spirally on the same side. It is called in the Tamul language Dog's Mustard, and the juice, pounded, into the ear, is used for deafness.

Tikta Shák (*Cratæva Roxburghii*).—The leaves are divided into three leaflets. The flower is white, and becomes cream-colored, with purple filaments. Met with about temples and Musalman tombs; it is also a native of the Society Islands, and is planted near the abodes of the dead. Sanskrit name *barun.*

Kál okerá (*Caparis brevis spina*).—Grows in dry ground. The anthers are blue, the two upper petals of the flowers are tinged yellow. Seeds have a hard horn at the extremity, crescent shaped, with the ends rounded. Fl. CS. Fruit of a beautiful red color.

10. Flacourtiaceæ.—Flacourte was a director of the French East India Company. Some of this species make a good jelly.

Buinch (*Flacourtia sapida*).—The *tikádárs,* or inoculators for the small pox, use the thorn of this shrub for breaking the pustules of the small pox, on the ninth or tenth day. The leaves are egg-shaped, and have sharp, straight edged teeth. Fl. CS. The fruit is eaten by the natives, hence the Sanskrit name *Svádu kantak,* the sweet thorn.

11. Linaceœ, *or Flax Tribe.*—Soft gummy seeds, but hard fibre. Herbaceous.

Masiná (*Linum usitatissimum*) *Flax.*—Cotton is to the Hindus for clothes what flax was to the Egyptians. The Sanskrit name is *atasi,* or bark made cloth. The stem, though it is only an annual, consists of woody fibre like that of a young tree. The seed, mixed with water, serves as a demulcent in diarrhœa; it is used by painters also for their colour. When the oil is pressed out, the seed-cake is used for fattening cattle and for manure, but it attracts white ants. When it is ripe, the capsule or seed-coat opens by dividing into ten valves, to discharge the seeds. The flowers are blue, and are arranged in, what botanists call, a cyrumbose panicle. The petals are five, sepals five, stamens five, the ovary has five cells, and there are five stigmas. The stamens are united at the base to a torus, from which proceed little teeth opposite the petals, indicating abortive stamens. The calyx and capsules are crenulate, *i. e.,* full of notches. The English make linen and lace from it. Fl. CS.

12. Malvaceæ, *or Clothing Plants.*—These plants, composed of one thousand species, supply food, medicines, clothing, shelter. The filaments grow together, enclosing the style, and forming a column in the centre of the flower. Leaves have stipules.

Banokrá (*Urena lobata*).—Capsules covered with crooked bristles.—Fl. RS. A mere shrub, yet it is closely allied to the same order as the *Adansonia,* the giant of the vegetable world, one hundred feet in diameter, with its roots nearly double that length, whose trunks are used in Africa as tanks, in Abyssinia as bee-hives, and in East Africa for burying doctors and magicians.

Jabá (Hibiscus Rosa Sinensis.)—The Chinese use the petals to make a black dye for their hair and eye-brows, and to black their shoes with. The petals when rubbed on paper give a bluish purple tint, very useful instead of litmus paper as a chemical test: they are also astringent. The Cochin-Chinese use the leaves as emollients. Its bladder-shaped inflated capsule has a fine transparent texture, covered with brilliant silky hairs, veined. The numerous seeds are attached to a central column. The roots are used by native doctors for snake bites.

Ban kápás (Hibiscus vitifolius).—Is a native of places abounding in rubbish: the leaves are five-angled, lobed, the flower is yellow and drooping. It yields an excellent strong fibre, equal to the finest quality jute.

Thal Padma (Hibiscus mutabilis).—The leaves are heart-shaped, five-angled. It changes the color of its flowers three times in one day; in the morning they are whitish, mid-day crimson, in the evening red. Very branchy, hence its Sanskrit names are *atichará,* going over—*chattra pattra,* umbrella-shaped leaves—*padmachárini,* having lotus-like flowers.

Poresh (Thespesia populnea).—The heart wood is very hard, is used for gun-stocks, but the white outside timber, like that of all the *Malvaceæ,* is soft and of little value. It has a remarkable tenacity of life; a large tree comes up in a twelve-month from cuttings, but though flowering freely, it is not reproductive, and requires to be planted from seed in order to be so. Flowers all the year.

Kárpás (Gossypium herbaceum).—Cotton was introduced into Egypt from India viâ Palmyra. The seeds of this species are clothed with a firmly adhering white down, which yields the cotton. It requires in Bengal a soil light, sandy, and moderately moist, as the roots send forth many slender delicate fibres. The soil must be light, well-broken, and the tap root must penetrate a certain depth to get hold of the soil; if the soil be too rich, the plant yields chiefly flowers, if too moist, the root or seeds rot. A kind of caterpillar will sometimes in a night destroy a field of cotton, hence in some places turkeys are kept to destroy those caterpillars.

13. STERCULIACEÆ, *or Sweets and Stenches.*—Some of gigantic size. Anthers two-celled. This order includes plants like the fragrant *kanak champa* and the fœtid *Sterculea*; it has a species, the *Durio zibethynus,* whose fruit is remarkably fœtid, but its taste is delicious.

Rakta Simul (Bombax Malabaricum).—Red cotton tree. A handsome tree, particularly in February, when its red blossoms shine out, with the branches shooting out nearly horizontally from the stem, three from one point making amongst them three equal angles: they are thorny like the trunk, with numerous conical thorns, which however extend only as far up the tree as animals are likely to molest it. The trunk has projections like the buttresses of a cathedral. In the hilly districts these trees grow to the height of one hundred feet. The wood is light and spongy, used for floating rafters. In Java the bark of the root is used as an emetic, and a solution of the gum is given in conjunction with spices in certain stages of bowel complaints. The powder of the root is considered by natives effiacious to restore the vigor of old age. The leaf-stalks are as long as the leaves, which come out in sets of seven, the two smallest at the bottom falling off in the cold weather: when the flowers first appear in the hot season, there are no leaves on the tree; the flowers have a sweet liquid, which the birds are fond of: the downy filaments attached to the seeds afford a kind of cotton employed in stuffing pillows and clothes, but are not strong enough for weaving purposes.

Dupahariya (Pentapetes Phenicca).—The flowers are bright red, expand at noon, and drop by daylight next morning: the petals are triangular, the calyx double: the leaves are spear-shaped, the margins waved, the stipules are subulate, *i. e.,* awl-shaped.

Kanak Champa (Pterospermun acerifolium).—The flowers are a pure white, and render water gelatinous. In Hindu poems the color of a beautiful female is compared to that of the golden champak. The leaves like those of teak when young, are covered with a star-shaped down; when fully grown, they are very hoary. The Sanskrit name is *karnikár, i. e.*, having a seed vessel like an earring. There is another *kanak chámpa* with lanceolate leaves and yellow flowers, which belongs to the *Ochnáceæ.*

14. TILIACEÆ.—Mucilaginous leaves, but fibrous barks.

Pát (Corchorus olitorius). Jute.—There are thirty-six species of this genus. The leaves are used for pot-herbs; the fibre is largely exported, and much used for the manufacture of gunny bags*. Fl. RS. It is used in Bahar toasted with honey for bowel obstructions. It is sown in great plenty about Aleppo; the Jews there boil the leaves, and eat them with their meat. The capsules are eaten; they are cylindrical, and have transverse partitions between the seeds, which have a pyramidical shape.

15. AURANTIACEÆ, *or Orange Tribe.*—Have dots in the leaves, which are reservoirs of oily secretions. Fragrant. The petals fold over each other. Almost the only tropical order which has fruits that can be sent at a cheap rate to cold climates, and this owing to its spongy rind, and oily receptacles.

Ashshaurá (Glycosmis pentaphylla).—Leaves pinnate; the small white flowers fragrant; in flower all the year round.

Kámini (Murraya exotica).—Noted for the exquisite fragrance of its white flowers, hence called *kámini*, or the lovely. These flowers however remain in blossom only three or four days, but the tree flowers three times yearly; and flowers in the evening. It is found wild in hilly districts; was brought last century from China to the Madras coast, hence called the China box. The leaflets are generally three pair, emarginate, *i. e.*, have small notches at the end: the leaf-stalks have a gland. Easily grown by cuttings.

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* In 1830-31 the export of Jute was 11,155 maunds, valued at Rs. 23,482. In 1855-56 it had increased to 11,94,470 maunds, valued at Rs. 32,74,768! Its price 3 years ago was 1½ to 2 per maund. Its present price may be quoted at Rs. 3 to 3-12 per maund. In 1830-31, the export of gunnies was 26,66,493 pieces, value 1,66,700 Rs. In 1855-56 it was 1,96,73,752 pieces, value Rs. 26,61,731.

Kath-bel (Feronia elephantum).—Elephant or wood apple. A large tree: the bark yields a gum having the properties of gum arabic. The leaves are feathered with an odd one from three to five inches in length, dotted round the margin with pellucid specks. The young leaves when bruised have a pleasant smell, they are considered stomachic: the leaf-stalks are articulated, and somewhat winged. Fl. RS. The flower is greenish white; the pulp of the fruit affords a very pleasant jelly; the scent very unpleasant when dry: the cortex is used by fire-workers. The Sanskrit names are *kapithya,* residence of monkeys—*dadithya,* root yielding a juice like curdled milk—*gráhi,* constipating—*manmatha,* love—*danta shata,* bad for the teeth.

Bel (Ægle marmelos).—Great reverence is paid by the Hindus to this tree, which they call *shriphal, i. e.,* the milk of the goddess of plenty bestowed on mankind. The tree is sacred to Mahadeva, and is worshipped at the Durga Puja festival. The Malabar physicians reckon the root, bark, leaves, and flowers refrigerant. The tree is to be found in the gardens of all their pagodas. Europeans cut the unripe fruit into small pieces, dry them, and form a decoction very valuable in diarrhœa and dysentery. A sherbet made from the ripe fruit mixed with tamarind juice is used in fevers, and is most valuable in dysentery. The Javanese regard it as very astringent. The Dutch in Ceylon prepare a perfume from the rind, which is also used in dyeing yellow. The roots are very aromatic and bitter. On the Malabar coast a decoction of the root of the bark is considered a sovereign remedy for hypochondriæ of the heart. The glutinous transparent juice found round the small white seeds contained within the hard shell of the fruit has the smell of turpentine. The fruit is larger, and the shell much harder than in the *Kath-bel.* The leaves in threes are scattered at the end of the branches; the leaves in decoction are used in asthmatic complaints; the young leaves are used as poultices in ophthalmia. The stamens are red. The mucous which surrounds the seeds is a good cement. The thorns are in pairs. Fl. HS.

16. Sapindaceœ, *or Soap-tree Tribe.*—The stems of the climbers have several centres of formation, though only one of them occupies its axis. The *Lichi* belongs to this order.

Ritá (Sapindus detergens).—In Cochin China and Java the nut bruised and agitated in hot water makes a kind of suds for washing. Fl. HS. The Sanskrit name is *arisha.* One of this species, the *Saponaria,* is used by Hindustani physicians, for preventing supposed demoniacal possessions.

Ashphal (Nephelium Longan).—A native of China and of the mountains of East Bengal. The wood is close-grained and white. The leaves downy, with large parallel veins, when young of a reddish hue.

17. Meliaceœ, *Tonics.*—Trees; stamens united into a tube. Compound leaves.

Nim (Azadirachta Indica) its Persian name, means the excellent tree; another species is called the Indian liliac, or bead tree, as the stones of the fruit are used in Roman Catholic countries for making beads. The seeds afford a very clear bitter oil, used for burning. The bark is used by Bengalis as a substitute for quinine, and in Java for worm complaints. The seeds after being skinned, are used for killing insects, and the kernels powdered and mixed with water, for washing the hair. The leaves scattered about the extremities of the branches beaten into a pulp, are used in bruises, cutaneous eruptions, or rheumatism of the head with great success: after small pox the natives of Madras cover their bodies with nim leaves. The pulp of the fruit, which is poisonous, yields a very bitter oil used in rheumatism: the oily juice of the fruit is used for head-aches arising from exposure to the sun; taken before exposure to wet, it prevents fever. The fruit is at first green, then turns yellow, and at last changes to a purple color. On the *Nága Panchami* festival in August, natives smear the doors of their houses with cow-dung and nim leaves, as a preservative from poisonous reptiles. The timber is a pale yellow, and is used in ship-building, and in making idols; no insect will attack it, it is so bitter. Its Sanskrit names indicate its medical properties *arishta*, relieving sickness—*pichumarda*, leprosy-destroying—*nimba*, the sprinkler.

Amurá (*Amoora cucullata*).—A tree of considerable size, but of slow growth. Looks very bare in the cold season, being then without any leaves.

18. Ampelideæ.—*Vines;* acrid leaves; fruit, a berry; mostly climbers with tendrils.

Harajorá (*Vitis quadrangularis*).—The natives eat the young shoots and tender leaves in their curries. Jointed; four-winged. Beaten up into a paste given by the natives for asthma. The leaves are reniform, *i. e.*, kidney-shaped; one at each joint of the stem. The berry is red; very acrid.

Ban Chálitá (*Lea crispa*).—The leaves in fives; bruised, are used in wounds, their veins are parallel, running off at an angle of forty-five degrees, corresponding in number with the serratures of the margin, and ending in the points as in the *chálitá*. The stems are jointed, swelled above the joints, have six to eight short curled wings. The leaf-stalks have their wings curled. The margins of the flower-stalks are grooved, the flowers are conspicuous for their elegantly curled wings. Fl. RS. Grows wild in the bushes.

19. Balsamineæ.—*Pretty flowers*, loving moist shady places; at maturity the valves of the fruit separate, and expel

the seeds with an elastic force. In England they retain their vigor in the hottest day, but droop at night when other plants revive. Leaves lance-shaped, edges of them saw-shape. Linnæus knew only seven species of this order; now one hundred are known.

Dopáti (*Impatiens Balsamina*).—So called, because when the seed is ripe, if you even touch the seed vessel at both ends at once, it will fly asunder with so much force that the seeds will be scattered to a considerable distance.

Domuti (*Hydrocera triflora*).—Called in Telinga the Water oleander, and *Noli tangere* from the force with which the seeds are expelled on a mere touch. The Turks use it as a symbol of ardent love. The stem is piped, five-sided, interrupted at the leaves as in the floating plants.

20. OXALIDEŒ, *or Acid Tribe*—Yield the *oxalic acid* in a crystallised form, a powerful poison. Their elastic integuments expel the seeds.

Kâmrânga (*Averrhoa Carambola*).—*Star apple*, used as an acid like the tamarind: it makes a marmalade. The Dutch, Spanish, and Portuguese physicians use it as an invaluable medicine for the sick in all inflammatory diseases, especially fevers and dysenteries. The leaves are sensitive, and are eaten by the Malays as sorrel.

Ámrul (*Oxalis corniculata*).—A native of the Malay Islands. Its Sanskrit names are *chukriká*, vinegar—*dantashatâ*, noxious to the teeth. In Dacca the washermen use the juice of this plant to take out iron marks.

2ND SUB-DIVISION.—CALYCIFLORÆ.

Whose stamens and petals arise from the seed vessel, or the calyx.

21. RHAMNACEŒ, *or Buck-thorns.*—Thorny shrubs. The thorns are undeveloped branches, and protect the plant in a barren soil, while when cultivated they gradually become branches.

Found everywhere, except in the polar regions. In China the leaves of one of this order are used as a substitute for tea, and the flower-stalks of another are eaten.

Kul (*or Zizyphus jujuba.*)—Easily recognised by its thorns and glossy green leaves, downy below, with three nerves. The natives are very fond of its fruit, and often get sick from eating too much of it, as it becomes sour and indigestible; it is like the English crab-apple. It is often attacked by a little worm, and at night by the large fox-bats, which sally out by hundreds, after the parrots, who have been feasting on it during the day, have gone to roost. When grafted, the tree produces a fine fruit. Humayan, the Emperor of Delhi, when defeated by Shir Shah, had to fly for his life, and this fruit was his only food in the desert of Rajputana; cough lozenges are made from it in England, and in the Moluccas it is used in diarrhœa. The leaves are three-nerved, green outside, white underneath. Sheep and goats are very fond of them, caterpillars (*Saturnia mylitta*) feed on the leaves, and by these a kind of *tasar* silk is made. Near the ruins of Gour the trees afford support to the lac insect. The stipules are thorny, the under one recurved, the upper sharp. The tree grows in hedge-rows about Geneva and Nice; its fruit is served up in Italy as a sweetmeat. The Musalmans are fond of cultivating it near their tombs; there are six varieties of this *Zizyphus* in the Mauritius.

Shyeákul (*Zizyphus Œnopli.*)—Its leaves, like those of the genus, have three ribs. The acid fruit is a great favorite with the thirsty traveller, and with mice. The bark dies leather red. Its leaves afford food to the lac insect, and to cattle. Fl. RS.

22. Leguminosæ, *or Bean Tribe*—contain species to be found in the snows of Lapland and the heats of India; floating in water and in the Sahara Desert; lowly herbs, and stately trees; nutritious as *papilionaceæ*, or purgative as senna, or gummy as mimosa, or acid as tamarind, or yielding a dye as indigo, or moving as sensitive plants; yet all known by their

pods, a carpel growing long and flat, separating when ripe into two halves; no albumen.

Shan (Crotolaria juncea.)—Indian hemp. The legumes are club-shaped, the stem is striated from the insertion of the leaves. Both sides are covered with soft silver colored hairs, and they are from two to six inches long. Flowers shape of a butterfly at rest, and a beautiful yellow. Leaves and flowers employed by natives as a narcotic. They have powerful intoxicating qualities. In the Northern Circars the natives feed their milch cows with the *sunn* during the dry season; it causes them to give much milk. The stem grows eight feet in two months, and so rapidly as to keep down the growth of weeds; the bark is separated by steeping in water its fibres, made into cordage and gunny bags. There are others of the same genus cultivated, as the *piyuli jjhanjan, bil jjhanjan, ban san, chhota jjhanjan, mana.*

Poung (Trigonella corniculata).—Fl. CS. Flower-stalks larger than the leaves; a pot herb; flower yellow. The *banpiring* has a white flower.

Hâkuch (Psoralea corylifolia).—The flower is pale lilac, with the wings and keel dark purple tipped. The seeds are aromatic and stomachic. It has at each joint a leaf two and half inches long.

Nil (Indigofera tinctoria.).—Indigo. Prohibited a long time in Germany, where it was called "the devil's dye." Columbus found indigo indigenous at Hayti. Bengal produces about nine millions pounds of indigo, valued at two millions sterling. The flowers are purple; the corolla has an awl-shaped spreading spur on each side of the keel. Its spindle-shaped tap root, three feet long, enables it in times of drought, to obtain nourishment deep in the earth. The leaflets are five paired, used for coloring the hair. A fall of rain soon after sowing kills the insects which would otherwise prey on it. The coloring matter is the pulp separated chiefly by fermentation in vats of water, the liquor extracted is green, but becomes blue from the oxygen of the atmosphere. The natives who stamp the plant get freed by it from all cutaneous eruptions. The Sanskrit is *mudhuparniká*, honey leaves. There is a common indigo plant that grows in the grass, the *bhángrá*. There are 24 different species of Indigo.

Aparájitá (*Clitoria ternatea*).—Common through Bengal. Flower blue, and remains the greater part of the year. Its root and powdered seeds considered good purgatives. Leaves winged. Corolla gives a blue dye, but not permanent. The Sanskrit name is *giri karniká*, "having leaves shaped like a mouse's ear." A native of Ternate in the Moluccas.

Dhanichá (*Sesbania aculeata*).—The fibres of the reddish bark are used for drag-rope nets, as it rots less in the water than *sunn*. They have of late years been converted by European manufacturers into rope for marine purposes. It is armed with inoffensive prickles. Fl. CS. Yellow leaflets twenty to forty pair. Legumes sharp pointed, eight inches long.

Kát Sholá (*Sesbaniá paludosa*).—Often twelve feet high. All the parts under water are very spongy, and emit numerous thread form roots. The parts above water are only one-third as thick. The leaves are horizontal, court the solar light during the day, and droop in its absence. Leaf-stalks channelled. Flowers bright yellow, with the back purple dotted.

Kálkasanda (*Smithia sensitiva*).—Leaflets, with the margins and foot-stalks ciliate, *i. e.*, hairs like the eyelash. Pods six-jointed, folded within the calyx. Cattle are fond of it, and it makes excellent hay.

Chámchiká (*Louria vespertilionis*).—Leaves highly colored; an uncommon looking, pretty plant; in flower and seed the whole year.

Banchárál (*Desmodium gyrans*).—In the day, the middle lobe of the leaf is horizontally extended: in the night it is bent, touching the stem; the lateral leaflets are moving all day, sometimes in a circular direction, by twisting their leaf-stalks: the motion takes its round in two minutes, and there are two motions, the one up, the other down, but under a strong wind, the lobes do not move at all. No motion at night, the plant sleeps then. After the process of fructification ceases, the motion ceases, and the plant dies down to the root. In some parts of Bengal the people on Saturday cut off two lobes, when they are near together, and pound them along with an owl's tongue; with this the lover touches his mistress, to make her tender-hearted. Root biennial.

Kudáliyá (Desmodium triflorum).—Helps to form the most beautiful turf we have in India. Cattle are very fond of it. The natives apply the fresh plant, bruised, to wounds that do not heal well.

Bat kaláy (*Cicer arietinum*).—Chickpea. In the Madras Presidency, an acid exuding from this plant is collected by the ryots, and is used in their curries instead of vinegar: flower bluish purple.

Bara chana (Vicia sativa).—Very common in a wild state; cattle fond of its leaves; when young the mark on the under side of the stipules is a glandular concavity, filled with a pellucid liquid, which dries up as the stipules get old.

Masur (*Ervum*). *Tare*—The *bara masur* (*Ervum lens*) has branches angular; the *chhota masur* (*Ervum hirsutum,*) has stems four-sided.

Matar (Pisum sativum) White Pea.—Stipules crenate, *i. e.*, notched. Cultivated near Patna. It is chiefly the *chhota matar* or grey pea which is grown in Bengal, the *jangali matar* (*or Lathyrus aphaea*) has seeds which are narcotic when eaten abundantly, but when ground are quite harmless.

Khesári (Laythyrus sativa).—Has a blue flower, the pods have a double keel on the back; seeds produce palsy, when eaten.

Kunch (*Abrus precatorius.*)—The seeds are used as weights by jewellers, each weighing one grain troy: as also in counting beads, hence called by the Germans the Paternoster plant. One species has red seed, another white, another black; the flowers are succeeded by pods containing the seeds, which are used in the Marquesas Islands as ornaments. The root is employed as a substitute for liquorice, hence its Sanskrit name *yashti madhu,* the honied stick. Fl. CS.

Bara Sálpáni (Flemingia congesta).—Fl. CS. Leaves in threes, leaflets three-nerved; flowers beautifully striated with orange and purple.

Ban barbati (*Phaseolus alatus*).—Kidney bean. Fl. CS. Flower deep rose purple; roots eaten by the natives.

Mug (Phaseolus or Gram).—There are: the *ghorá mug,* children eat the seed, the plant has too many stiff hairs to be liked by cattle—the *háli mug* or green gram much cultivated in the cold season and succeeds the rice as a crop—the *kála mug* or black gram—the *soná mug* or yellow gram:—the seeds of the latter are eaten. In Calcutta, in Dr. Roxburgh's time, the price was Rs. 2½ for 84lbs. From the *másh kaláy,* bread is made for religious ceremonies. The *mugáni* or wild gram is a favorite with the poor.

Shim bátráji (*Dolichos glutinosus*).—Flower yellow. There are various species as the *ban shim* with purple flowers; the *svet shim* with white; the *rakta shim* with red, the *bágh nakha shim,* with its pods scythe shaped, and like a tiger's claw, the *chári kona shim* with a quadrangular pod, the *mákhan shim,* and the *kála shim* poisonous.

Álkashi (*Mucuna pruritus*).—*Cow-itch.* Common in hedges; the hairs of the pods are used to poison wells in hilly districts. Its Sanskrit names: *átmagupta*—self-preserved—*kapi kachu,* monkey-itching—The pods are black, and make a good vegetable.

Arar (*Cajanus Indicus*).—The seeds are known as *dál*; *stem* often as thick as a man's leg, produces a good fire by friction. Branches furrowed from the insertion of the leaves. The bractes concave, pods spotted with dark purple. There is one kind that requires seven months to ripen its seed, but yields five hundred fold, another ripens in three months, but yields only one hundred fold.

Karanjá (*Pongamia glabra*).—A tree whose leaves fall at the close of the cold season. Stipules bent backwards. Calyx of a dark purple color. Wood very useful, cattle fond of the leaves: seeds yield an oil used by natives in itch and rheumatism. Its Sanskrit name *karanjika*, *i. e.*, water colored.

Náta karancha. (*Guilandina Bonduc*).—A febrifuge by the well-known name of *kát kalijá*. An ubiquitous plant, found on the burning shores of the tropics in both hemispheres, and, like the Coco palm, one of the plants which migrates or has migrated through the agency of the Atlantic and Pacific currents. It is a creeper. The seeds exceedingly hard, bruised into a paste, are taken with chiretta in fevers, they are very bitter and tonic. The calyx is one-leaved, salver-shaped. The thorns of the branches arch backwards. The nuts are worn as beads, and the boys use them as marbles. In Amboyna the people eat the nuts to make them strong. Leaves are bipinnate; stipules pinnate.

Bakam (*Cæsalpina sappan*).—Pods shaped like a trapezium. This tree affords the red wood of commerce, which is extensively exported as a dye wood. The dye is not easily fixed; nevertheless it is much used in India as well as in Europe.

Amal kuchi (*Cæsalpina digyna*).—Seeds yield an oil used in lamps: stipules subulate, *i. e.*, awl-shaped; Petals streaked with red.

Krishna Churá (*Poincianapulcherrima*).—From its variegated flowers, orange, red, yellow, green, it has been called Peacock's crest: it is also named Barbados flower fence; in the West Indies, the French call it *Fleur de Paradis*. The petals are clawed and notched: the flower-stalks are pale green at the base, and become red above: the racemes are corymbiform, the stamens are longer than the petals, and are woolly at the base; it flowers the whole year. The seeds are divided from each other by a kind of spongy substance. The trunk, when old, is generally hollow, and occupied by large dark brown ants, which, when disturbed, issue forth in numbers, and by their bite, inflict a severe wound on their disturbers. Leaves are green during the rains, afterwards become a bright red. From the leaves and bark a juice is extracted having some of the properties of gutta-percha.

Ashok (Jonesia asoka).—Called after Sir W. Jones, who was not only a good Sanskrit scholar, but also a good botanist. Its flowers, when they first expand, are of a beautiful orange color, gradually changing to red, fragrant during the night: pod scimitar shaped.

Tetul (*Tamarindus Indica*).—*Tamarind,* well known for its shady head and beautifully veined wood. The leaves called by botanists abruptly pinnate, are used for the eyes as collyria, decoction of them is applied externally in fomentations. The leaves are considered to have a damping effect, hence grass is seldom seen under the tree. Natives consider it unsafe to sleep under it, and in Scinde the natives say that a night spent under its cool shade gives a fever in the morning. The pods have a firm acid pulp, used in sore throat as a laxative, and to quench thirst, they are seven or eight inches long, and contain five or more seeds, shining, angular, which are eaten. Tamarind stone, when reduced to a fine powder, made into a thick paste with water, and smeared on the skin, rapidly promotes suppuration in blind boils: the same powder boiled into a paste with thin glue, forms one of the strongest wood cements. The flowers have five equal petals of a brownish yellow, three of them streaked with pink, the anthers are nearly of a rose color. The stamens and the style both curve upwards. The fruit is a fine preserve; one hundred tons of it are imported annually into England from the East and West Indies, and Brazils. Its Sanskrit names express its qualities: *tintirá,* damp—*chinchá,* edible—*chukrá,* vinegar—*gurupatra,* abundant in leaves—*dhàtri,* nurse.

Kálkásandá (Cassia sophora).—On May the 10th, the commencement of the Satyea Yoga, Hindu women worship this plant: five or six families proceed in company to the river with all the ingredients, and there worship it; its leaflets are scythe-shaped, eight to ten paired, the lower much smaller. A clavate or club-shaped gland is at the base of the leaf-stalk. Fl. CS. yellow. There is another variety, the *kálkálkasandá*, with a dark purple stem.

Dáda Mardan (*Cassia alata*).—Conspicuous by its beautiful yellow flower, and its leaves two feet long with channelled leaf-stalks. The fresh leaves are often employed to cure ring-worm, hence its Sanskrit name *dadrughna.* The Telinga and Tamul physicians say it cures poisonous bites. *Stipules* ear-shaped. Fl. CS.

Chákundá (*Cassia Tora*).—The seeds, ground with some butter-milk, are used to ease the irritation of itching eruptions. It is fœtid, mucilaginous, gently aperient. Its Sanskrit name is *parni*—leafly. The leaflets illustrate what is called the obovate cuneate shape; and there is a subulate or awl-shaped gland between each of the two lower pairs.

Kánchan (*Bauhinia acuminata*).—Trunk scarcely any: leaves nine-nerved, the middle nerve ending in a short bristle between the lobes: leaf-stalks jointed at the base.

Lajak (*Mimosa pudica.*)—Sensitive plant: leaves digitate, *i. e.*, shaped like the hand spread open.

Kuchi kánta (*Mimosa rubiacalis*).—Flowers purple, gradually become white.

Páni nájak (*Desmanthus natans.*)—Stem piped; between the joints, spongy bodies are formed, which prevent the plant from sinking. The roots have no connection with the earth. When the water leaves it, it soon perishes. Flowers reddish.

Sháikántá (Acacia suma).—The bark is remarkably white, hence its Sanskrit name *shaktuphala,* "white like barley meal;" the leaflets have fifty pairs.

Shirisha (Acaciá sirisa).—Gum found on it. The flowers very fragrant.

Bábula (Acacia arabica).—Timber used for building. As in all the *Acacia* genus, the leaves are bipinnate. Gum is produced from this tree, but owing to the dampness of the climate it is not equal to the Arabian. All the cart-wheels in Guzerat are made of babul, and they are put together without a single nail; the wheel is salted when finished, and by the deliquescent property of the salt, is rendered proof against the dry air of the hot weather. The bark is used for tanning, and gives a red color. The leaves afford good food for sheep and goats: the pods are excellent food for milk buffaloes: also for making soap and calcining silver. Good charcoal is made from the wood. The best seeds for germinating are those vomited by sheep or goats, who will not digest them, or which have been boiled for two or three minutes in water. Its flowers are like scented golden bells—

> Our rocks are rough : but smiling there
> The *acacia* waves his yellow hair,
> Lovely and sweet,
> Nor loved the less, for flowering in a wilderness.

The tree grows rapidly, and requires no water: hence it is suited for the desert. All over India it flowers and ripens its seeds at various times of the year. There are other species, the *shálséi bábulá* and the *guyá bábulá (Acacia Farnesiana)*, a sweet smelling species, the Sanskrit names are *vri*, enemy (by its thorn,)—*barbara*, curly-headed.

23. Combretaceæ.—Astringent; bark and fruit used in tanning.

Bádám (Terminalia catappa) Country almond.—The kernels are equally as wholesome and nutritive as the almond, and yield a pure limpid oil; the branches rise in tiers, are vertical, decrease in length, and form a pyramidical head. The leaves are horizontal, growing in clusters at the end of the branches, hence the name *terminalia;* they are between obovate and wedge-form, and turn red a little before falling off. In the South Sea Isles the bark and leaves yield a black pigment, with which the teeth are dyed and ink is made. The drupe or stony fruit is nearly two inches long, and grooved. It grows wild in Batavia. In Madras the levers of draw wells are made from its wood, and clothes are made from the fibres of the leaves; there is another species called the *babura* (*Terminalia bellerica*) the flowers of which are fœtid, the bark yields a gum, and the kernels eaten in abundance are intoxicating. There is another species the *haritaki* (*Terminalia chebula*), whose fruit is called in the North-Western Provinces "mother of doctors," the galls of which are much used by dyers; harness-makers use the fruit to make blacking with. It is not a native of Bengal.

24. RHIZOPHORACEŒ.—Roots in the mud of salt swamps. The mangrove grows in the Sunderbunds: its seeds begin to germinate and send out roots while they are yet attached to the parent branches.

Kángkrá (*Brugiuera Rhedii*).—Wood yellowish; trunk generally dividing before it reaches the ground, like a parcel of hop-poles piled up in the form of a cone.

25. LYTHRACEÆ.

Dádmari (*Ammannia vesicatorta*).—Leaves very acrid, have a strong, muriatic smell, used in blistering, bruised and applied, they raise a blister in half an hour.

Mendí (*Lawsonia inermis*).—"The Indian box," used for hedges, as its grows readily from cuttings; its flowers are greenish yellow, the smell is more pleasant at a distance than near. The leaves, beat up with catechu, dye the skin and nails of a reddish orange permanent color called henna: much used by Indian women, the Moslem women dye thair hair red with it. In Barbary and Upper India it is used for staining men's beards, the horses tails and manes red. It has four sepals, four petals, four stamens, four capsular divisions, germs four celled. The seeds are angular.

Járul (Lagerstrœmia regina).—Calyx variously grooved on the outside. The timber is used in India to make knees for ships. Flowers of a dark blue; very beautiful. Seeds narcotic, bark and leaves purgative.

26. TAMARISCINÆ.

Iháu (*Tamarix indica*).—Fond of sandy river banks. Fl. RS. Very beautiful flowers. Galls astringent, used in medicine and dyeing. The ashes of those growing near salt water yield the sulphate of soda. The natives confound this with the Casuarina, which is a much loftier tree. The leaves are scaly. Used in Scinde for firewood.

27. ALANGIACEÆ.

Dákaiti phal (*or Alangium hexapetalum*).—Called also *akar kanta* and *bagh angkra.*—Wood beautiful, and fruit edible; roots aromatic. The Malays say it has a purgative property.

28. MYRTACEÆ.—Aromatic, with leaves dotted, generally opposite; veins at the margins of the leaves.

Peyárá (*Psidium pyriferum*). *White Guava.*—It has spread very much in Tahiti, and is much liked by the natives there, where it is so abundant in March and April that even the hogs will not eat it. In Jamaica the guavas are propagated by the pigs, which after tearing up the ground in search of roots, drop the undigested seeds of the guava into it. It also in Jamaica prefers low swampy places, that are inundated in the rainy season, and affords food and shelter to thousands of rats, which build like squirrels in its branches. The stony hardness of its seed resisting the digestive powers of animals, tends to disseminate it there in every direction: no pasturage will grow on the plains it covers. It came from Africa to India; it is a native of tropical America. Like all highly flavoured fruit, it is a great favorite with the Malays and Chinese. Europeans use a jelly made from it. The leaves are somewhat aromatic, and are much used in the Eastern islands medicinally, or as a substitute for the betel leaf. The wood of the old trees is exceedingly tough and close-grained; it is used for gun-stocks, as it takes a good polish, and is rarely known to split with heat, or fracture from blows. The fruit is turbinate, *i. e.*, has the figure of a top.

Kála jám (*Eugenia jambolana*).—Bark whitish, astringent, dyes brown; branches form a handsome shady head; petals round. Fruits great favorite with man and bird, astringent. There is also the *Chota jam*, whose leaves and fruit are small, and not as edible.

Dálim (*Punica granatum*).—*Pomegranate.* It was called *Punica granatum*, because its grained fruit was first found near Carthage, from thence was brought to Rome in Scylla's days. The cultivated species said to be introduced into India from Persia sometime before 1791: first cultivated in England in 1548. It came from Spain to Persia and from Persia to China; it is held in repute as a cooling drink, a principal ingredient in many sherbets and sweetmeats: it is a fertile source of poetic allusion. In the South of Europe, and in Bombay, it is used as an ornament for hedges. In Persia it forms extensive woods. The rind and flowers were used by the Romans for medicine; red leather is dyed in Germany with its rind, which also produces as good ink as that from galls. On account of the profusion of the seeds, the ancients considered the pomegranate a mystical fruit, typical of abundance. A decoction of the bark of the root is employed by natives in worm diseases. The flowers and rind of the fruits are tonic and astringent, and used in dysentery; the leaves are pointed at each end, the flowers conical.

(To be continued.)

Correspondence and Selections.

Chinese White Wax.

(Extract of a letter from Dr. McCartee, *of Ningpo, dated* 23*rd November,* 1855, *to* Mr. R. Fortune.)

I send some branches of the tree with the nests of the insects upon them; my messenger however only brought six or seven twigs, although I told him to bring an arm-full. I also procured a small quantity of the wax, but the quantity procured in this neighbourhood is very small; and as the wax is prized by the Chinese as a vulnerary, they asked a larger price for it than my servant felt at liberty to give, and so he only brought a sample, which in every respect resembled the wax sold in the shops as *pih lah.* The present not being the proper season for it, I did not think it worth while to do much more in the matter at present. I, however saw the trees, which are only to be found, the Chinese say, on the banks of streams, and ascertained also that not many of them had the insects upon them. They are not aware that they are found upon any other tree, but I have seen nests in every respect exactly similar, upon the *Rosa Banksia, Lonicera sinensis,* and even upon the wood-work of my garden. As soon as I can procure the insects in a living state, or the tree with the wax undisturbed as deposited, I will be happy to send it to you to any address in Shanghai you may designate, and also any additional information you may desire on the subject.

(Extract of a letter from R. Fortune, Esq., *dated H. C. Botanic Garden, Calcutta, February* 11*th,* 1856.*)*

I have the pleasure to send you a beautiful specimen of the wax-insect procured for me by Dr. McCartee, of Ningpo. I also enclose his letter to me on the subject. I suspect there are living insects* amongst the wax, and that it may be possible to put them on the trees I sent to you from China. At all events the specimen is a beautiful one, and the first of the kind seen by any English traveller in China.

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* The insects were all dead.

(Extract of a letter from Dr. McCartee, *Shanghai, dated 24th December, 1855.)*

I have just received your note, having arrived here last week in the *Confucius*. After several unsuccessful trips in search of "the wax," I at last found some trees on which I descried the desired article. There are, it seems, two crops in the year, the first in August, the second in November, but the latter is but a light one; only a few of the trees had wax upon them, and of these but one or two twigs in most instances were covered. One large branch which I succeeded in getting, looked as if it were covered with snow, all the leaves having fallen, and it had really a beautiful appearance. Unfortunately, I came away at such a short notice, and it was so difficult to carry safely, that I was unable to bring it with me. I have brought however two or three twigs, which look like pretty specimens, and I should be very happy to let you have some. There is no doubt in my own mind that the tree is a species of *Ash*. It is from 30 to 40 feet in height, and grows by the banks of the canals and ponds, where it is planted by the Chinese to afford shade to them while working their chain pumps in irrigating their grounds. As to the "nests" I feel more doubtful. They had all disappeared from the trees on which I found the wax, but, as I informed you, when you were at Ningpo, I have frequently, found such nests on other trees, and even on the posts and walls of houses. I have found one on the wall of the house where I am now stopping (Mr. Downes, outside the great south gate,) I was assured by a manufacturer of candles, that the Chinese collected and brought the wax to his shop for sale, but only in small quantities, as not much is produced near Ningpo, and that is mostly kept by the inhabitants of the vicinity where it grows, as an application to cuts and wounds of a like nature. You know how little satisfaction is to be obtained when we seek information on such subjects from the Chinese, indeed I had not gone a hundred yards from the trees on which I found the wax, before I had apparently got beyond the range of all that knew any thing about it. Not more than 4 or 5 out of 300 or 400 people that I met in a walk of 3 miles recognized it; most of them wondered where I had found a branch of *lah-mei* in flower so much before its time.

Note on specimens of Clays from Oude: by Capt.

W. H. Lowther.

The accompanying specimens of clays from the station of Persuddypore, Salone Pergunnah, Province of Oude, were obtained from hollows and dry jheels situated on the right bank of the Sihi Nuddee, at a point close to cantonments. They were found highly useful for building and pottery purposes, and appeared to bake in the fire of a fine ruddy hue. There are a great many forts in that particular portion of Oude, built with bricks of unusually enormous proportions: at Roy Bareilly, near the main gateway of the ancient castle, they are seen many *cubic feet* in size, and on fracture present a fine vermillion hue, and possess a rough saline taste. The same remark applies to the numerous dilapidated wells, which, like the forts, are several hundred years old. No where have I seen such a variety of useful earths (including saltpetre,) as in the little explored province of Oude. From my own small experiments with the accompanying clays, I can particularly recommend them to the notice of modellers, and workers in small ornamental wares. I have just despatched a chest full to an amateur sculptor in Europe, who had applied to me,—for the "plastic clays of the Ganges," which have a high reputation among European artists for purposes of design;—but I consider the present samples as far superior, having less grit, or stony matters in their composition, besides being tougher when moist, and harder when dry.

The crude lime, I send you, was found in an alluvial hollow at the distance of a few feet from the surface, and was obtained in any quantity by sinking wells over the strata. These beds are about 4 miles from the cantonment, and seem to be inexhaustible. I have seen chunam prepared as follows, as white as snow; the crude product having been made up into balls the size of an orange, is burnt in a kiln, brought to an intense heat with cow-dung fuel, until thoroughly calcined; the masses are then pulverized and sifted through cloth,—only those who have witnessed the dazzling whiteness of this lime can appreciate its value. I employed it for the minutest and most delicate purposes, and had I not left Oude so soon, should have given it a trial in the composition of factitious stone, and other architectural compounds.

A new description of Bullock Cart.

(Extract of a letter from Dr. S. Clark, *Officiating Post-Master-General, N. W. P., dated Agra,* 17*th June,* 1856.*)*

I have this day despatched by bullock train a small case to your address, containing the model of a bullock-cart fitted with a self-adjusting break, which I believe will be found very useful in descending, and even in ascending, steep hills. In the latter case it will, in combination with the ground rollers, as they may be called, effectually prevent the cattle backing.

Several kinds of self-adjusting breaks have been designed in England and elsewhere, but none, as far as I know, so simple, cheap and easily fitted as this one, and none of them can be made available for preventing backing in ascending, as the body of the cart with its load moves back upon the axle, consequently in ascending, if allowed to act, the cart would tilt up.

Such things are not generally required in this country, but instances occasionally occur, and the idea of carts on this principle, first suggested itself to me in connection with the extension of the Government bullock train to Simla on the Hindustan and Thibet road, and similar carts might be found useful in other parts of India.

The Shantung Bean.

In August, 1844, Capt. Bigge, Assist.-Commissioner, Assam, presented the Society with several kinds of seeds which he had brought round from China, among others a description of pea on which he submitted the following remarks :—" Of the esculents the large white pea is deserving of this notoriety, that it forms the staple of the trade of Shanghai, or nearly so, to the astonishing amount of 10 millions of dollars, or 2½ millions sterling. This I give on the authority of the Rev. Mr. Medhurst, of Shanghai, and Mr. Thom, H. M. Consul at Ningpo. The peas are ground in a mill, and then pressed in a somewhat complicated, though as usual in China, a most efficient press, by means of wedges driven under the outer part of the frame-work with mallets. No description would suffice without a drawing. The oil is used both for eating and burning, more for the latter purposes however, and the cake, packed like large Gloucester cheeses, or small grindstones in circular shape, is distributed throughout China in every direction, both as food for pigs and buffaloes, as also for manure."

Mr. Fortune's notice being directed to the above observations, with a request that he would endeavour to procure a supply of the peas in question, he was kind enough to accede to the request, and sent them with the following remarks:—

Dear Sir,—Your letter dated the 27th September, came to hand a few days ago. I have lost no time in complying with the wishes of the Society regarding the Shantung beans alluded to by Capt. Bigge, whose notes you have sent me. It is quite true this bean forms the staple article of native trade between the province of Shantung and the towns of Shanghai and Ningpo. Large quantities of it are brought down in the state in which I send it to you. The oil and the oil-cake also comes South in large quantities. This oil-cake is quite the *guano* of China, and is highly esteemed by Chinese agriculturists. I believe, however, this is the only purpose to which it is applied, and that Capt. Bigge has been misinformed when he was told it was "used as food for pigs and buffaloes." Other kinds of oil-cake such, for example, as the cotton cake, are used as food for animals, but not the bean cake, at least so the Chinese invariably tell us.

In addition to the two kinds of Shantung beans, I send you other two sorts very like them, which are largely grown in the Shanghai and Ningpo districts, and used in the same way as the more Northern kinds. Nos. 5, 6, 7, 8, 9, are also in common cultivation here, and may be of value in India.

SHANGHAI:
December 7th, 1855. R. FORTUNE.

Materials for Paper manufacturing.

The following communications were read at the general meeting of the Society in February, 1856, from Colonel Jenkins, Dr. Riddell, and Mr. Bridgman on the above subject, accompanied by certain specimens of paper. In his first communication Colonel Jenkins remarks as follows:—

" Some time ago I suggested that it was possible that our reeds might be convertible into a pulp for paper, with reference to which I have cut out from the *Calcutta Literary Gazette* a notice of some experiments by the Chevalier DeClaussen, on plants furnishing paper pulp, which I dare say have not escaped you. What he says of the *Papyrus* appear very interesting, and deserving of some notice by paper makers in this country. We have no end of allied plants in the families *Cyperaceæ* and *Juncaceæ*, and if it were found practicable in this country to reduce the plants to a pulp, we might be able to import it in large quantities in a dried and packed state; or the plants might be dried only, and then be pressed into bales, to be reduced to pulp at home by machinery. Of all the *Cyperuses* nearly mats are made by the natives, and some of them are beautifully white, and there seems but little doubt we might send them home in the state as prepared for being woven into mats with no small profit, if found to be well adapted for making paper, of which there seems little doubt, after Claussen's experiments. But we might send some bales to him. Mats are also made of various *Juncuses*, and they are so similar, that I have no doubt they can be equally used. I think it also likely that our common *Phrynium dichotomum* (your Calcutta mats) might be found serviceable, and other plants of the families of *Marantaceæ* and *Zinziberaceæ*. The *Alpinias*, for instance and *Costuses*, of which plants there are no end throughout the eastern districts. Since I wrote you about preparing the bamboo pulp, Herring's work on paper and paper machinery has fallen into my hands, and in that there is a brief mention of the mode in which pulp is manufactured from the bamboo by the Chinese (p. 31); but though the bamboo paper may be useful for many purposes, if Mr. Claussen is not entirely mistaken, the cheapest article and the best will be found amongst the grasses. Amongst the specimens of paper attached to that, No. 20 is entirely from wheat straw, and as good paper as need be; I have had some reams of cheap note paper from London made from wheat straw, I forget whose patent, and I find it an excellent paper to write on with steel pens. But if wheat straw affords a good pulp for paper, I should think rice straw would give a better, for it is apparently a much tougher substance."

The following is the notice of Chevalier De Claussen (referred to by Colonel Jenkins,) on *Papyrus*, *Bonapartea*, and other plants which can furnish fibre for paper pulp:—

" The paper-makers are in want of a material to replace rags in the manufacture of paper, and I have therefore turned my attention to this subject, the result of which I will communicate to the Association. To make this matter more comprehensible I will explain what the paper-makers want. They require a cheap material, with a strong fibre, easily bleached, and of which an unlimited supply may be obtained. I will now enumerate a few of the different substances which I have examined, for the purpose of discovering a paper substitute for rags containing about 50 per cent. of vegetable fibre mixed with wool or silk, which are regarded by the paper-makers as useless to them, and several thousand tons are yearly burned in the manufacture of prussiate of potash. By a simple process which consists in boiling these rags in caustic alkali, the animal fibre is dissolved, and the vegetable fibre is available for the manufacture of white paper pulp. Surat, or Jute, the inner bark of *Corchorus indicus*, produces a paper pulp of inferior quality bleached with difficulty. Agave *(Phormium tenax,)* and Banana or plantain fibre (Manilla hemp,) are not only expensive, but it is nearly impossible to bleach them. The Banana leaves contain forty per cent. of fibre. Flax would be suitable to replace rags in paper manufacture, but the high price and scarcity of it, caused partly by the war, and partly by the injudicious way in which it is cultivated, prevents that. Six tons of flax straw are required to produce one ton of flax fibre, and by the present mode of treatment all the woody part is lost. By my process the bulk of the flax straw is lessened by partial cleaning before retting, whereby about 50 to 60 per cent. of shoves (a most valuable cattle food) are saved, and the cost of the fibre reduced. By the foregoing it will be seen that the flax plant only produces from 12 to 15 per cent. of paper pulp. All that I have said about flax is applicable to hemp, which produces 25 per cent. pulp. Nettles produce 5 per cent. of a very beautiful and easily bleached fibre. Palm-leaves contain 30 to 40 per cent. fibre, but are not easily bleached. The *Bromaliaceæ* contain from 25 to 40 per cent. fibre. *Bonapartea juncoidea* contains 35 per cent. of the most beautiful vegetable fibre known; it could not only be used for paper pulp, but for all kinds of manufactures in which flax, cotton, silk, or wool are employed. It appears that this plant exists in large quantities in Australia, and it is most desirable that some of our large manufacturers should import a quantity of it. The plant wants no other preparation than cutting, drying, and compressing like hay. The bleaching and finishing it may be done here. Ferns give 20 to 25 per cent. fibre, not easily bleached. *Equisetum* from 15 to 20 per cent. inferior fibre, easily bleached. The inner bark of the lime-tree *(Tilia)* gives a fibre easily bleached, but not very strong. *Althea* and many *Malvacea*, produce from 15 to 20 per cent. paper pulp. Stalks of beans, peas, hops, buck-wheat, potatoes, heather, broom, and many other plants, contain from 10 to 20 per cent. of fibre,—but their extraction and bleaching present difficulties which will probably prevent their use. The straws of the *Cereals* cannot be converted into white paper pulp after they have ripened the grain; the joints or knots in the stalks are then so hardened, that they will resist all bleaching agents. To produce paper pulp from them, they must be cut green before the grain appears, and this would probably not be advantageous. Many grasses contain from 30 to 50 per cent. of fibre, not very strong, but easily bleached. Of indigenous grasses, the Rye grass contains 35 per cent. of paper pulp; the *Phalaris* 30 per cent. *Arrhenatherum* 30 per cent., *Dactylis* 30 per cent., and *Carex* 30 per cent. Several reeds and canes contain from 30 to 50 per cent. of fibre easily bleached. The stalk of the sugar-cane gives 40 per cent. of white pulp. The wood of the *Coniferæ* gives a fibre suitable for paper pulp. I made this discovery accidentally in 1851, when I was making flax cotton in my model establishment at Stepney, near London. I remarked that the pine-wood vats in which I bleached were rapidly decomposed on the surface into a kind of paper pulp; I collected some of it, and exhibited it in the Great Exhibition,—but as at that time there was no want of paper material no attention was paid to it. The leaves and top branches of Scotch fir produce 25 per cent. of paper pulp. The shavings and saw-dust of wood from Scotch fir gives 40 per cent. pulp. The cost of reducing to pulp and bleaching pine-wood will be about three times that of bleaching rags. As none of the above-named substances or plants would entirely satisfy on all points the wants of the paper-makers, I continued my researches and at last remembered the *Papyrus* (the plant of which the ancients made their paper,) which I examined, and found to contain about 40 per cent. of strong fibre, excellent for paper, and very easily bleached. The only point which was not entirely satisfactory, was relative to the abundant supply of it, as this plant is only found in Egypt. I directed therefore my attention to plants growing in this country; and I found to my great satisfaction that the common rushes (*Juncus effusus* and others) contain 40 per cent. of fibre, quite equal, if not superior, to the *Papyrus* fibre, and a perfect substitute for rags in, the manufacture of paper, and that one ton of rushes contains more fibre than two tons of flax straw."

In a second communication Colonel Jenkins advises despatch of a small parcel of paper made by the Khamptis about Sadiya from the bark of a wild *Morus* (*Papyfera?*) "It is"—Colonel Jenkins adds—"very much like the Bootiah and Nepal paper, which is also made from the bark of a shrub, *Daphne*, but this is not a very fair sample, it can be made much whiter and more even,—but it shews that for all wrapping purposes, at least, there need be no want of materials if rags fail. I see in the papers the mention of paper made in Italy from the common mulberry, and I suppose the pulp of that tree and of this is just the same."

Dr. Riddell mentions that the paper submitted by him has been made from the fibre of *Hibiscus esculentus* and *H. cannabinus*, "at a place near to Aurungabad, between it and Roza, famous for the Hindoo cars and temples; the place is called Karghas Warrah, where a particular caste of people have resided for a very great length of time, subsisting by the manufacture of paper known throughout the Deccan as Dowlatabad paper, and much used by native bankers for hoondies." Dr. Riddell mentions that the above fibre is as cheap again as rags, and very easily bleached. Dr. Riddell adds his opinion that paper might be produced from the refuse of the *Roosa* grass after the fine and well known oil had been obtained from it.

Mr. Bridgman announces that the paper forwarded by him has been made in England from straw. "I do not know,"—remarks Mr. Bridgman,—"that the material is confined to the straw of wheat; I suspect that the straw of oats, barley, and rye are equally used, but I certainly understood the term 'straw' to imply only to the stalks of grains of this kind. Paddy straw, I should think, would do equally well, and as all these are species of grass, I propound the question whether the tough *kooss* grass of this country, which grows wild every where, and is eradicated with difficulty, would not answer as well or better. I imagine it not improbable that the question would turn upon the degree of facility with which its colour may be discharged, which the paper-makers of course could determine at once. There are other wild grasses, of a similar tough nature, which are produced in great abundance, and could be supplied, I imagine, at a very low price."

In connection with the above, the Secretary read the following extract of a letter to his address, received by the last mail, from the Manager in London of the newly formed "Colonial Fibre Company," one of whose objects is to prepare fibre of a cheap description from the plantain, and other tropical plants, for paper purposes:—"When I wrote you in June, I had overcome the difficulties respecting it, but did not actually get my Charter of Incorporation until the following month. My arrangements are now going forward with spirit for the West Indies, and I may say, in reply to your remark about 'turning my attention to your quarter,' that, as soon as my organisation for the West is complete, it is my full intention to do so; and I hope that intention will be carried out with not less effect than Westward, your rates of labour being much in favour of the East. Although I lost 12 months by the misconduct of the authorities of the Board of Trade, as regards my Charter, I did not quite lose my time. My arrangements for Jamaica, and British Guiana have been, in every respect, so entirely perfected in the interval, that I commence operations with advantages which would have been wanting, had I gone forward at the period which an earlier grant of the Charter would have led me to do. Amongst other things, constant attention and experiments have enabled me to make most important improvements in the machinery. Those improvements consist (whilst maintaining my principle, as embodied in the patent) in simplifying the construction, by omitting all delicate parts, liable by accident or design, to be deranged; diminishing the cost of the machinery: saving a great deal of labour, and adding immensely to the power of the chief machines; which you will comprehend when I tell you, that each machine, on the improved principle, will prepare, with nine hours steady work, from 1,000 to 1,200 pounds of perfect fibre a day. I am taking out patents for the improvements, and when I have the specification perfected, you will hear more of it if you do not before, which is far from unlikely."

At the conclusion of the perusal of the above letters, it was resolved that the necessary steps be taken to obtain a few bales of the various grasses, &c., referred to by Col. Jenkins and Mr. Bridgman for transmission to the London Society of Arts for transfer to the Chevalier DeClaussen. In reference to the paddy straw, the Secretary stated he had been informed by the Manager of the Serampore Mills, that the only hindrance to its use on a large scale for paper manufacturing, for which, from its cheapness, the quantity readily obtainable, and its qualities in other respects it is so well adapted, was the difficulty of bleaching it,—a difficulty which, as yet, had baffled the ingenuity of various practical chemists to whom the subject had been referred.

Report from an eminent Firm in London, on specimens of Fibre and Paper from the Dheroos (Hibiscus esculentus).

(Communicated by the Society of Arts).

1st. "The fibre is strong and suitable for the purpose of making paper, although from the smallness of the quantity supplied, it is almost impossible to name its market value, but at the price quoted, say 2*s*. 6*d*. per cwt. in India, and 7*s*. per cwt. freight and charges, I have no doubt of its meeting with a ready sale in the English market.

2nd. The paper sent from India is estimated to be of the value of 44*s*. per cwt. in its present state, which deducting 18*s*. 6*d*. per cwt. import duty, would leave 25*s*. 6*d*. per cwt. as the intrinsic worth of the article in bond.

If the paper could be supplied of the even texture and surface of the enclosed specimen, its value would be raised to 54*s*. per cwt.

The *points therefore to be determined by the Indian merchant are:—

1. Whether it would be advisable to ship the fibre with a probability of its realising the price intimated?

2. Would it be profitable to deliver the paper in London @ 25*s.* 6*d.* per cwt. in its present condition?

3. Would it be preferable to attempt to improve the manufacture to such a point as to make the article worth 54*s.* in London, duty paid?

, The specimens reported on were sent to the Society by Dr. Riddell in 1855. See *Journal*, Vol: IX p. 112.

The Muddar Plant,—its useful properties.

†A subject that occupied the attention of the meeting, held on the 11th August, 1856, was the various useful products afforded by the Muddar plant (*Calotropis gigantea*), as exemplified, more especially, by certain carpets placed on the table which had been manufactured with the downy filament contained in the follicle, or seed-pod; of that plant. Major Hollings, the donor of these carpets, who was present at the meeting, mentioned that the manipulation of the floss is precisely the same as of cotton; the thread is not so strong, but it appears to take colour just as easily. These carpets, Major Hollings stated, had been made by the prisoners in the Jail at Shahpore in the Punjaub; they had, unfortunately, reached Calcutta in a damaged state; but if the finest Cashmere shawls or richest silks had been exposed as they had been, he doubted if the colours would present a better appearance than those in these carpets. To prove that the floss will retain colours, the small specimens (also placed on the table) which were presented by him to the Society in November, 1854, bore ample testimony; but Major Hollings thought that a good mordant was still required. It was generally expected in India that when attention was first attracted to a new product complete specimens should at once be produced. When the small wild esculent root was first introduced into England no one anticipated that by cultivation it would become such an excellent and useful vegetable as the potato now is. The tiny pods of the wild cotton shrub were very different from the magnificent full bolls of the American plant. Major Hollings added he had not given up his expectation of seeing the fibre from the muddar extensively used; and if, without laying out any large sums, persons interested in the introduction of a new product, would adopt the suggestion made some time ago by Colonel Tremenheere, of the Bengal Engineers, to cultivate the muddar

as a hedge plant, or on waste lands, we should be able to determine, in a very few years, if any good or useful product could be made in sufficient quantity to form a staple of export trade. Major Hollings stated that the two larger carpets, measuring 7 feet by 3½, cost from 6 to 7 Rs. each, and the three smaller ones, measuring 2 feet square, 2 Rs. each, and he concluded by observing, that every member of the Society could judge for himself, whether, if such articles could be made by the prisoners in a Punjaub jail, much superior ones ought not to be produced if the material were subjected to the perfect manipulation of Europe, and the complete processes of chemistry.

Dr. Thomson remarked, in reference to the above communication, that the chief point to be ascertained, was whether the milky juice of the plant was a non-conductor; at present it was believed that it was a conductor of electricity. Major Hollings observed that he had tried an experiment on a small scale, the result of which induced him to suppose that it was a non-conductor. He had covered a thin brass wire with the substance, and placed it on a brass vessel filled with water, the gutta percha touched both sides, and was laid all along the bottom of the vessel; the wire was attached to the discharging point of a simple electrical machine, and the sparks drawn from the other end were apparently as bright and the shocks as strong as could ever be got from the machine at any time. Major Hollings deprecated the idea of his opinion being of any value on such a subject, and merely mentioned the fact as having occurred under his personal observation. He also stated that he had generally followed all Dr. Riddell's experiments, and obtained the same results as had been so frequently described in the interesting communications which Dr. Riddell had from time to time made to the Society, but having read that in preparing the real gutta percha the fresh juice is at once subjected to the process of boiling, he had tried the experiment, and found that, after six or seven hours' boiling at a brisk heat, the juice curdled, and then assumed an appearance of consistency. Should further experiments confirm this result, much time and labor now indispensible in the manipulation would be saved. Major Hollings mentioned that in attempting to utilise a new product, those who really took an interest in the matter required the assistance and cordial co-operation of those who were able to give information that would ensure a successful result, and he adduced an interesting fact regarding the muddar gutta-percha. He had had an opportunity of collecting some ancient coins in the Punjaub; but as he was not acquainted with numismatology, he was enabled through the medium of the muddar gutta-percha to secure the assistance, which was invaluable, of his two friends, Major Cunningham, of the Bengal Engineers, and Major Bush, of the 24th Regiment Bengal Native Infantry. On being plunged into hot water the gutta percha becomes quite soft and pliant, and will take the most minute impression. By exposure to the air the dies became hard, and any number of impressions of the coins might be taken precisely in the same way and with the same kind of ink as is used in taking an impression from a seal. As the coins were obtained, impressions were sent to the two gentlemen above mentioned who, with great kindness, classed them, and said which were worth keeping. Eventually eighty-seven of the coins were taken to England, and at his, Major Hollings' request, presented to the British Museum by Major Cunningham.

In connection with the above, the Secretary read the following extract of a letter recently received from Dr. Riddell, regarding the milky juice of the muddar plant:—

"I observe in the proceedings attached to the last published number of the Society's Journal, some remarks regarding the muddar gutta percha, that the report made upon it was, that although it resembled in many points the true gutta percha, it was too soft to be used as a substitute. I beg to mention that I have now by me a lump of the substance which I had the juice collected for me in the cold season at Bolarum during the early part of January this year, but being much engaged in making preparations for my departure, I did not pay any particular attention to the inspissation of the juice, and left it on dishes in an empty room, where it dried without exposure to the sun. After it was boiled as usual, I was surprised to find it much whiter than any I had previously prepared, besides being considerably harder, as it is, at this present time the hot weather in no way effected it, and even though the climate now is moist from the rains, it still is as hard as any manufactured gutta-percha I have met with; probably this may be owing to the season in which the juice was taken from the plant, or the mode of drying, or perhaps both combined. At all events parties interested in the matter may give it a trial during the cold season, for I cannot but think that at no very distant period the discovery of a substance so closely resembling gutta-percha, and uniting so readily with it, will be found a matter of much importance."

On the Transplantation of the PERUVIAN BARK-TREE *into Dutch East India ; by Dr.* DE VRIESE.*

Were this notice intended for the learned world alone, it would be necessary to treat the subject more amply than is now attempted, as nothing more is desired than to enable the inquiring reader to understand what Quinquina is, its value to mankind, and the views that have actuated the Dutch in what they have done in this important matter.

On some points of a scientific nature it has been necessary to be more diffuse than in other respects was desirable, as the greater part of the uninitiated (and who would misinterpret this term?) are not generally acquainted with the specialities of natural and medical science ; in other respects, conciseness has been necessary to avoid too great amplification.

From the earliest scientific information we know that the inhabitants of South America have done nothing to hinder the unlimited collection, we should almost say robbery, of the Quinquina woods. No one thinks of their cultivation, and the Public Authority seems not to be interested in it, or is not able to be so: the latter, we should be disposed to conclude, when we consider, after Weddell, that the Quinquina district covers an extent of 2,000 square miles.

We notice also that unheard-of quantities are exported ; nay, what is more, now and then whole woods are burnt up. It may be unknown to the Peruvians and Bolivians less than to Europeans, that the quantity diminishes, and that the trees which are felled by thousands, are not so speedily succeeded by others, that replace them. Whoever descends the Andes, to visit the woods in which the Quinquina grows, finds his way from the sound of the reckless axe of the Cascarilleros, as they mercilessly, in an unexampled manner, hew these beautiful trees. This rough handling is not alone working fatally for the future, but all accounts are unanimous that an incredible quantity of bark is lost in the most reckless manner.

These circumstances have the sad consequence, which De la Condamine foresaw as probable, and that all late travellers confirm, namely, that there is a visible diminution in the quantity of Quinquina trees.

Don Antonio de Ulloa† thirty years after De la Condamine, uttered a warning against the distruction of the Quinquina woods, and proposed that strong prohibitive measures should be taken against their abuse. This, although very late, sixty-six years after, the Government of Bolivia considered, viz., in January, 1838, it issued an order against the exportation of Quinquina wood for five years.

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* Extracted from a Work entitled 'De Kina-Boom uit Zuid-America overgebragt naar Java. Door W. H. De Vriese. 'S Gravenhage. (Translated by James Perrin, Professor of the English Language at Leyden.) 1855.'

† Writer of 'Noticias Americanas,' vol. i. 1772, 8vo. See also Hooker's 'Companion to the Botanical Magazine,' i. 247.

Pereira* makes the remark, that as these trees are produced but in one quarter of the world, and no care is taken of their cultivation, it is nowise to be wondered at that this bark, in the course of time, should disappear from commerce.

Stevenson† declares that if the Government of America do not take care to preserve the Quinquina-tree, either by forbidding the felling of it, or by obliging the authorities of the provinces to take strong measures to prevent the destruction of the tree, it is much to be feared that this excellent production of the New World will be wholly exhausted.

Weddell, in the Introduction to his 'Histoire Naturelle des Quinquinas,' says that his attention has been given to all sorts of Quinquinas. These are his words —"L'immense accroissement pris par le commerce des Quinquinas dans ces parties, rendait en quelque sorte nécessaire un travail à leur sujet. A une époque aussi où la consommation de ces écorces, et surtout de leur principe fébrifuge, la Quinine, devient de plus en plus considérable, je crois qu'il peut étrê utile d'appeler l'attention sur less ècorces qui un jour devront remplacer la Quinquina Calysaya, dont l'épuisement devient de plus en plus imminent. Ces espèces, si elles sont beaucoup moins riches en principes actifs, nous offrent encore, par leur abondance, quelque sécurité contre la chance prochaine de nous voir privés du médicament le plus précieux du régne végétal."

Several Dutch naturalists, whose zeal in the advancement of science for the good of mankind and the glory ot their country is above all praise, have, for more than twenty-five years, urged upon the Government, both at home and in India, the transplantation of the Quinquina-tree from South America to Java. Those gentlemen have been Messrs. Blume, Korthals, Reinwardt, G. J. Mulder, Miquel, Fromberg, Vrolik, and others.

It will be superfluous to say that successive Ministers for the Colonies have considered these propositions, and all who were officially called to it, and could throw light on the subject, have shown their interest in, and their desire for, the accomplishment of this object.

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* 'The Elements of Meteria Medica and Therapeutics,' by J. Pereira, ed 3, vol. ii. part, 2, pp. 1605, *et seq.* London, 1853.

† Narrative of Twenty Years' Residence in South America, ii. 60.

Some of these naturalists have thought it probable that after some years, if the Quinquina-tree should be exhausted in South America, the culture of it might succeed in Java. Others have thought that neither pains nor money should be spared to transplant from Peru to Java a tree which would grow as luxuriantly there as in America.

The desirableness of the transplanting was continually kept in remembrance; but the Government supposed the thing impracticable. The wish to obtain seeds of this tree, through the Dutch consuls in different States of America, was disappointed, the difficulty of obtaining them being so great, on account of the distance of their stations from the woods of the interior of Peru, Bolivia, and New Granada. Seeds and plants were often promised by one and another, but these promises were not realized, although they were continually renewed. It was sufficiently clear that the only means to obtain seeds or plants of the Quinquina-tree was to send thither a proper person to fetch them.

To find such a person was not easy. Various knowledge, botanical knowledge, and particularly an acquaintance with the Quinquina, were required. A great constancy and intrepidity in danger and in the difficulties of long journeys in foreign countries, and especially a strong constitution, would be requisite in one charged with so important a mission.

Meanwhile the experience and information obtained by Mr. Weddell, in South America, were not lost to the naturalists of the Netherlands. His fame, but particularly his excellent writings, as well as the barks and dried specimens, collected by him in Peru, were not only known and appreciated here, but came freely into the possession of Dutchmen and of their scientific institutions. In the Museum of Paris they were submitted to the inspection and research of the professional and interested with a praiseworthy liberality, of which the writer of this communication was able to bear witness during his sojourn in the French capital.

In the month of June, 1852, the Minister for the Colonies proposed to the King, that a proper person should be sent to South America, to collect seeds and plants, and to transport them directly to Java, and he was empowered to despatch Mr. Justus Charles Hasskarl, late Botanist of the Botanical Gardens at Buitenzorg, Java, on the mission.

The choice of so competent a man may in all respects be considered fortunate. Mr. Hasskarl, by a long residence on the Island of Java, had become accustomed to the influences of a tropical climate. He had a strong constitution, and was of middle age. For many years he had given evidence of a great love for the science, and a comprehensive knowledge of the Flora of Java. His numerous published writings evince great accuracy, perseverance, and industry. His travels and investigations in India had furnished him with an uncommon measure of experience in travelling, particularly in overcoming the difficulties which so often arise out of the nature of a tropical soil.

From his sound judgment and caution there was every reason to believe him particularly fit for this mission; it is not to be wondered at, then, that he immediately attracted the Minister's attention who proposed him to the King for this important service. Expectation was not disappointed, as the result has shown, for the object of Mr. Hasskarl's mission to South America, has been attained.

A plan was prepared and proposed, though he was left to his own judgment and prudence, and was only charged not to confine himself to the Calisaya Quinquina plant, but to collect as many as possible of the other sorts of Quinquina, which are found at various heights above the level of the sea. He was to go from Southampton to Chagres, and so on over Panama to Guayaquil and Loxa, whence he was to journey inland. To save time, preference was given to the steam-voyage to Panama, above the longer one of doubling Cape Horn, which would have caused a delay of three months at least before the traveller could reach the places from which he would have to direct his course towards the interior of South America.

On the 4th of December, 1852, Mr. Hasskarl left the Netherlands for Southampton, which he quitted on the 17th of December, on board the steamboat La Plata, arriving at St. Thomas on the 1st of January, 1853; on the 12th, at Aspinwall, by Chagres; and at Panama on the 14th, just three days too late to continue his voyage by the steamboat that touches at the ports on the west coast of South America.

Being thus detained, he on the 25th continued his route to Payta, to go thence to Guayaquil. With the knowledge however that the rainy season would render his journey fruitless, he changed his plan and went to Lima.

In the beginning of May he ascended the first, and then the second Cordilleras, thence he descended into the lower part of Peru. Here it was that he saw, for the first time since leaving Panama, a luxuriant vegetation, but which however was far from being comparable with that of the last-mentioned country.

To what difficulties such journeys are subject, may be generally known from the accounts of travellers in the pursuit of natural history; but it may not be uninteresting to the reader to be informed of Mr. Hasskarl's experience in that respect.

The roads over the mountains of Peru are bad, mostly not broader than a bridle-path, and there are often on one side deep and dangerous precipices; it is impossible for travellers meeting to pass each other. When the crest of the second Cordilleras is passed, the traveller finds steps rather than roads. Here the way must be traversed on foot, the baggage being borne by Indians, if one is so fortunate as to find any. Setting forth on foot by Vitoc to Monohamba and Uchahamba, Mr. Hasskarl had the satisfaction to see the first Quinine-trees in their natural state, although these were not the Calysaya Quinquina, which are found in Southern Peru and Bolivia. Returning from Monohamba, across the second Cordilleras, he went to the capital of the province of Zanja.

Near Uchuhamba Mr. Hasskarl saw a great number of true Calisaya Quinquina-trees, but he was only able to collect a few of the plants and seeds. Of that good sort he collected a large quantity of seed, besides about fifty plants, which, after being packed with much difficulty, were sent from Lima to Holland on the 28th of July, 1843. This packet contained, besides seeds of "*Calisaya*," four packets of "*Cinchona ovata*," and a small quantity of "*Cinchona pubescens*." In a letter to the Minister for the Colonies, dated 12th August, Mr. Hasskarl sent a small bladder of seeds of the "*Cinchona amygdalifolia*." After a voyage of about a month and a half, these objects arrived in a good state at Lima. They were addressed to some one acquainted with their culture, and by him packed in Wardian cases, and despatched to Panama. Owing to a misunderstanding of the carrier, they were detained there; and when, after experiencing the influence of a tropical heat, on arriving at Lima, all were dead. Here we had to lament the loss of the soil in which those plants were set in the cases, which, if it had been chemically examined in this country or in India, might have thrown some light on the culture. However the seeds arrived safely, and were consigned to the Directors of the Botanical Gardens of the Universities, and at Amsterdam. We shall revert to these seeds later. From Uchuhamba the traveller went more southerly, where the people, who had revolted against the Government, and declared themselves free, not unfrequently threatened his life, for they looked upon him as a spy of the Peruvian Government. Often, and that too in the night, wholly and suddenly forsaken by his guides, was he obliged to wander about, without the most necessary food, to seek his old track, being whole days without seeing a human being.

The opinion that the Quinquina-trees are found together in woods, growing as it were, in company, is again, by the experience of

Mr. Hasskarl, refuted. They are often scattered, and sometimes, even in the Quinquina districts, very difficult to find. Can the contradiction which, in these statements, exists between the earlier and present writers, be explained by the destruction of the woods, which has taken place during the last half century?

Arrived in the province of Caraboya, he cherished the hope that he should there find the Quinquina-trees still full of fruit and seed, and *that* from information given him. This hope was disappointed, as the seeds were already scattered.

In the latter end of September, 1853, Mr. Hasskarl arrived at Cuzco, the old Inca town. Passing from there to Sandia, the capital of the district of that name, where alone the Quinquina, as far as Peru is concerned, is collected, he put himself in connection with some old and experienced bark collectors (*Cascarilleros practicos*), to obtain information, and to make inquiry concerning the places where the Quinquina-trees grow. Thus he was enabled to see a great number and variety of the Quinquina species, but it was his misfortune to discover that he had come too late to collect seeds, for the fruits remaining on the trees had already dropped their seeds. It may not be improper to remark here that the Quinquina seed is extremely fine and light, and surrounded by an exquisitely fine membrane, so that it is easily blown away and lost, but also, that to this cause may be traced the wonderful extent of the Quinquina-trees in South America.

It was even less possible at that time to obtain young plants of those trees. In Caraboya however the trees were very scarce, much scattered, and thus rare, as the Cascarilleros had grubbed up all the old or seed-bearing trees. It is therefore often necessary to cross the great river, and thus to go over the boundary of the country of the wild Indians, with a faint hope of success, to look for these trees, and to find scattered here and there in the woods, young plants that have grown up from seeds.

In this manner, being disappointed in his expectation that his journey would be finished with 1853, he determined to return to Lima, and pass the rainy season there till April; however he changed this place, where, in the meantime, the yellow fever had broken out in a severe form, for Chili, where a cooler climate seemed to promise the restoration of his impaired health and strength. Advices from the Netherlands induced him to settle at Arequipa, where he was expecting to receive news of a score of Wardian cases, which he bought at Lima, being forwarded to Islay. Having received this advice, he determined to go to a distance of 150 Spanish leagues into the interior, to make further investigations.

A series of difficulties however presented themselves, which rendered the obtaining of Calisaya plants almost impossible. Peru and Bolivia were at war with each other. In the former year, the frontiers of the latter were wholly forbidden to the Peruvians. Mr. Hasskarl however believed that the restraint had been removed, with the exception of a small port on the "*desaguadero*" (outlet), lying at the south corner of the Lake Titicaca, which favourable change might have been brought about by the departure of the Peruvian armies, under the command of Echinique, to reduce Arequipa, where the insurgents had ranged themselves under the banners of Castilla.

Bolivia was the country to which his attention was particularly directed, for there, according to the information, right or wrong, he had received, the Quinquina-trees were not so widely spread, but in certain places, called "*manchos*," appear in great numbers, and grow much higher. If he might be fortunate enough to penetrate into the more deeply situated districts of Bolivia, the chance of collecting seeds and plants was not unfavourable, as the Calisaya of Bolivia, which is collected here, is the Quinine Bark *par excellence.*

The frontiers of Bolivia were soon reached. Mr. Hasskarl was soon at La Paz, not far from the snow-mountain at Lutchis, a Bolivian frontier village, where he learned that the military order, forbidding the passage of the frontier, had not been revoked, as he had been erroneously informed.

He was thus obliged to determine to retire on the Peruvian territory, which he did, with the plan of going to Sandia in an easterly direction, keeping along the Bolivian frontier. With what pains and difficulties this expedition was attended can scarcely be conceived, unless we gave the detailed account furnished by himself which our present space forbids. At the frontier places of Peru are often found Bolivians, who are generally Cascarilleros. For these the passage of the boundary was not forbidden, as it was for the Peruvians. They carry on their trade, have their families and abodes in Bolivia; they export all sorts of objects or produce, and were not only disposed to serve Mr. Hasskarl, but they afforded all wished-for help, so that he was (naturally for an equivalent,) very quickly supplied with plants by some, with seeds by others. Awaiting these, he went from one frontier place to another, and at last reached the above-mentioned Sandia, which he determined to make his head-quarters, and to which the objects to be delivered were to be forwarded at an appointed time, that he might pack them. He determined also to visit the places deeper inland himself, and to study, as much as possible, the Quinquina Calisaya.

Meanwhile, the agreement with the Bolivians for plants and seeds of Quinquina-trees, for which provisions and strong drinks were given to those people, to load their mules, and to serve as barter, was fulfilled, and by this means he really succeeded. While Mr. Hasskarl was gone from Sandia eastwards, one of the Bolivians arrived with a very considerable number of plants. Having received information of this, he returned speedily to Sandia to secure all, that the plants might not suffer from the air and heat. On arriving, he found about 400 Calisaya plants, although not all of the strength for which he had agreed. The person who brought them must have had a very difficult journey to arrive at Sandia with this precious cargo.

We shall not here enumerate the difficulties and dangers with which Mr. Hasskarl and that precious burden had to contend before he had accomplished a distance of 150 leagues, to bring those objects in a safe state to a place of shipment. The necessary means were contrived and put in action to obtain the seeds promised, but in this he was not able to succeed. The person who had undertaken to secure them, and to follow him on his arrival at Sandia, to Arequipa and Islay, and for which sufficient travelling expenses were allowed, did not come; at the same time, the interest that was felt in keeping the plants alive did not admit of delay.

In the packing of the plants several circumstances required attention; first, the plants were to be made sufficiently damp to be able to reach the coast without drying up, notwithstanding the strong drying winds, and the almost perpendicular rays of the sun. Particularly was it necessary to protect them against this last, against the great warmth during the day; while on the other, it was equally necessary to guard these precious objects against the other extreme, the cold of the evenings and nights, which on those mountains is sufficiently severe. Just in the months from June till August, the water on the high tablelands (particularly at night) is frozen to ice. If it had been the aim of the indefatigable traveller to transport the plants set in *earth*, the weight, and the consequently increased number of beasts of burden, would have caused more hindrances; the plants themselves, but particularly their roots, would certainly have been injured by the continual shaking of the animals. It was also necessary, in other points of view, to provide for the plants in such manner that they should not have to suffer; considering that large plants were difficult to preserve from the injurious external influences before mentioned. The sprigs were closely packed together with the roots in damp moss; each packet was wrapped in the bark of Pisang stalks, and fastened with sackcloth, and made into small bales, somewhat resembling wool-bales, as those in which goods are forwarded on the lamas from the interior to the coast. The Pisang stalks necessary for this packing had to be fetched from the lowlands, on the shoulders of Indians; the moss, which did not grow at Sandia, was obtained in the mountain districts; all which, on account of the awkwardness and laziness of the Indians, cost much pains, time, and money.

But with the greatest difficulty was the necessary rope obtained. Four persons were sent into the lower woodlands to collect bark, and work it up so as to serve for rope. Strong cords were required to bind the packages on the beasts of burden; these were ordered at Cruzero, and in this Mr. Hasskarl met with cordial co-operation. The collecting of so many mules in this solitary and out-of-the-way place was no slight matter: they were weak animals, that could not carry half the weight the mules of Arequipa were able to bear on their backs.

After a legion of difficulties of divers kinds, too many and too various to sum up here, the expedition started from Sandia on the 8th of June.

It seemed however as if the difficulties would never come to an end. The animals were driven forward as fast as possible, but it was necessary, for the sake of the plants, to shorten the way as much as it could be. From early in the morning till late in the evening they travelled on, almost without interruption, to leave the hill-country, with its extreme changes of temperature, behind; and to get as far off the highway as possible, that the cavalcade might incur no risk from the numbers of troops, who took possession of all transports as contraband of war, and that the plants, which were threatened with many dangers from that cause, might arrive in safety.

Arrived at Azangora, they learned that no beasts of burden were to be obtained, as they were all required by the insurgents belonging to the party of Castilla, to carry muskets brought from Bolivia to Cuzco; whereas other drivers had taken the district of the mountains, to avoid being compelled to a like service for the corps of General Roman, who was on the way from Puno to Cuzco. It appears that the strife of the two Republics against each other, and the troubled condition of the contending parties, caused the indefatigable and courageous traveller many difficulties, and almost occasioned the failure of his mission.

We will not now follow him in the enumeration of his disasters, but only say that, not counting five days when he was detained by meeting with the soldiers, he, by means of forced marches, accomplished the journey from Sandia to Arequipa in a week; thence, embarking on a ship ready for sea, he went by Islay to Callao, and thence direct to Java.

It seemed as if the courageous traveller must encounter new difficulties at the end of his mission. Islay was again in possession of the party of Echenique. An attack for the conquest of Arequipa was preparing there. But the means of transport were wanting. Mr. Hasskarl required many beasts of burden to transport his packages. To obtain these there was no sort of prospect. It was feared, and, as it appeared later, not without reason, that the animals would be seized. The profits of the expedition were not an equivalent to the risk the drivers feared they should incur. The party of Castilla, which was uppermost in Arequipa, moreover, did not permit the departure to Islay, and the one danger brought on the other. At last, when damages for the possible loss of the beasts was promised in case of need, and some persons of influence in Arequipa placed themselves in the breach for Mr. Hasskarl, his desired departure was allowed. On the journey to Islay nothing important happened, but at that place however the beasts were immediately pressed into the military transport service. The Wardian cases were arrived at Islay, but the frigate did not appear till a fortnight afterwards; this induced him to depart for Callao on a vessel going thither in ballast. In three days he arrived there. On the passage Mr. Hasskarl unpacked his Quinquina plants, which he was able to do without interruption. He had reason to congratulate himself on their state, though they had been for more than four weeks shut up from light and air, when cutting through the stems a fresh colour appeared. He immediately planted them in convenient cases. On the 7th of August, late in the evening, he arrived at Callao, and on the 27th he was ready to set out for Java, having passed the interval at Lima.

As soon as the cooler west coast of South America was left, the heat began to increase daily, so that during the greater part of the day the thermometer marked 80° to 86° Fahrenheit. This made Mr. Hasskarl very careful of his plants, which, from his observations, have in their natural position a temperature not above 60°, and generally below 50° Fahrenheit, and sometimes even at freezing-point. The objects had much to suffer in this heat, which must have been injurious to them, since they had made, including the transport from Bolivia, a land journey of six weeks. Shades of tents, etc., might ward off the sun's rays, but the glass cases were dully obscured with steam inside. The cases were opened, to clear away the mildew that had collected in them; and it was found good to repeat the operation daily. The mildew was continually renewed, and had to be taken away. At the beginning of the voyage, and after leaving the Sandwich Islands, the cases were inspected, and those that required water were supplied with it, however very sparingly.

The stronger plants only began in any degree to sprout; the others showed no signs of doing so, although the stems evidently retained life. Some of them during the voyage began to shoot out at the root, whereas of the weaker plants, the parts above the soil appeared to be dying off, although it was apparently to be expected that they would shoot later. It was thought advisable not to endanger the plants by an untimely inspection, or loosening of the soil.

We were informed, under date of the 22nd of December, 1854, that Mr. Hasskarl had arrived at Batavia on the 13th of that month, with twenty cases containing Quinquina plants, and at the same time, that a longer delay at Callão was caused by the difficulty of obtaining provisions and fuel; further, that at about 150 leagues from the Philippine Islands, the ship had encountered a dreadful hurricane, and had suffered much damage. They arrived at Macassar on the 3rd of December. As a longer voyage now was considered bad for the plants, Mr. Hasskarl took his collection on board a steamship stationed there, and arrived at Batavia on the 13th, as mentioned.

Measures were immediately taken by the Governor-General to transport the plants to the higher-situated Tjipannas, in which however a delay of two days was occasioned by the tempestuous weather.

Mr. Hasskarl, on his arrival, was charged with the cultivation of the Quinquina at Java.

We have mentioned some seeds sent by Mr. Hasskarl to the Netherlands. The consequences thereof are to be considered as resulting directly from the mission carried out by that gentleman, and what is to be said of them will find an appropriate place here.

Seeds of various sorts of Quinquina have successively been received at the Colonial office as follows:—

1. *Cinchona Condaminea*, Lamb., var. δ, *lancifolia*, Wedd. *C. lancifolia*, Mutis, collected in New Granada, and presented to His Majesty's Consul-General there, Mr. Lansberge, by the famous traveller Karstens. From these seeds a few plants have been raised in the Academical Garden at Leyden. From Mr. Hasskarl were received—

2. *Cinchona amygdalifolia*, Wedd. Sent immediately to Java per Overland Mail.

3. *Cinchona Calisaya*, Wedd., from the Valley of Sandia, in the province of Carabaya, in Peru. Of this sort a quantity was sent, immediately on its arrival, by post to Java; another quantity was sown in the Botanical Garden.

4. *Cinchona Calisaya*, Wedd., var. β, *Josephinæ*; sown, but come up badly in the Garden at Leyden.

5. *Cinchona ovata*, R. et P. (*Cascarilla crispilla, rhiqua* or *Chiqua.*) We were informed that this, like No. 4, grows as a shrub in the neighbourhood of Hohubamba (Peru), 5 6000 Paris feet, on sunny slopes; whereas No 5 grows at 6–7000 feet in high woods, and even on slopes in a mouldy soil, more or less mixed with mica-slate, which circumstances were taken into consideration in laying the seed to germinate, and in the raising of the plant.

The seeds received (with the exception of those sent directly to Java,) were immediately distributed by the Minister for the Colonies to the Directors of the Botanical Gardens of the Universities and of Amsterdam, to be germinated, and further cultivated. It will be unnecessary to mention that these directors, deeply impressed with the importance of the matter, used every effort to make these objects answer the views of the Minister. In the beginning of 1854, and since, in 1855, his Excellency, even a short time after the sowing, received from the Botanical Gardens favourable reports concerning the germination.

With reference to the seeds that the Minister sent by the Overland Mail to Java, to be sown, favourable advices have been received from the Governor-General, (see lower); which last circumstance induced the Minister to request the return of the seeds from the Gardens in the Netherlands, and to send them likewise by Overland Mail to East India. It will be readily seen that the Minister, in trying and promoting the matter by all the means in his power, has had no other aim than that of assuring himself of the success of the intended transplanting. The Quinquina plants raised in the Gardens progressed in their development so much, that even in 1854 some were sent to Java. This really took place, and they were sent from Leyden, Utrecht, and Amsterdam.

1. From Leyden, plants of *Cinchona Calisaya*.
2. From Utrecht, plants of the *Cinchona ovata*.
3. From Amsterdam, plants of *Cinchona Calisaya* and *Cinchona pubescens*.

Of No. 1 favourable reports have been received; of No. 2 such are still expected.

Could there possibly be a doubt as to the correctness of the naming of the sorts of those received from Mr. Hasskarl under the name of "*Cinchona Calisaya*, Wedd."? I think not. The Government had sent a thoroughly competent person, and one who, by a long experience in the investigation of nature, had become a clever botanist, and whose writings testify to his strict exactness and scrupulous nicety in the smallest particulars; his love of truth is above all praise; his special knowledge of the subject must be a guarantee against all mistake. With such security for my conviction, I thought to be able, *à priori*, to foresee, that from the seeds which the Government has been pleased to entrust to the Botanical Gardens, if they germinated, no other plants than the Calisaya Quinine-tree would appear, under which name I received them.

The result has not disappointed the expectation. The Quinquinas here developed are *Calisaya* plants. A strict inquiry has proved this to me as certainly as science only can.

Under date of the 21st. of October, 1854, the Governor-General informed the Colonial Minister that a great part of the Quinquina plants had attained such a growth that they could be planted out in a regular garden. Later advices concerning the planting out do not inform us of the preservation of the greatest number of the plants which came up from seeds at the Tjibodas, but this was not to be expected; this has nowhere, or never been the case with transplantation. Experience yet teaches us that plants produced from seeds do not always grow up and remain sound.

The result of the culture of the Quinquina, under the direction and care of Mr. Teysmann, as well those obtained from seeds of Mr. Hasskarl as those sent on former occasions from Leyden and Amsterdam, is as follows: —

In the beginning of the month of November, 1854, Mr. Teysmann went to Tjipannas to prepare the ground for the transplanting of the Quinquina plants there.

The ground which Mr. Teysmann judged proper for the purpose was then covered with heavy wood; this however being prepared, the transplanting began. It was about half a mile above the Garden of Tjibodas, perhaps 300 or 400 feet higher than this place, and consequently 4600 to 4700 feet above the level of the sea. The soil is very mouldy, with a porous, greasy, red subsoil, in which trees of colossal height, mostly 150 feet, with a diameter of four to six feet, thrive luxuriantly, but which however are now cut down. The land lies to the north-west of the deep ravine of Tjibodas, on the slope of the Gedeh mountains, and offers above, as well as below, good ground for extending the culture, provided that the woods be felled. The climate through the whole year, but particularly in the rainy season, is very damp, and the vegetation is at times wrapped in the clouds.

To these are now to be added the *Calisaya* plants brought directly from Peru by Mr. Hasskarl, those sent by Willink of Amsterdam, those sent and yet to be sent from the Gardens of the University and of Amsterdam, and the plants which at different times have been sent from the Netherlands to East India, besides those which are yet to come up from seeds now there; by which it may be computed that the plantations already made are, or will be in a short time, much more numerous than the success of the culture required.

How well soever we may be convinced that all the care we can desire is given to the plants by Mr. Teysmann, it is not likely that the cultivation can be taken to heart better than by him who, on innumerable occasions, has risked his life in the countries from which he brought the living trees to Java. The observations concerning their growth, and the natural state of the places where they are found, can be applied to the culture at Java. Numerous particulars, which the most curious observer, who has not visited the original places where they grow, would pass by, are here brought to bear by the experience of Mr. Hasskarl. The long residence of that natural philosopher at Java, his acquaintance with the topography of the Island, with the elevations, table-lands, mountain, and their slopes, the constitution of the soil, and the comparison of all these with those in the countries where the Quinquina grows; this rich treasury of knowledge and experience, we are of opinion, enables us to look for success to attempts so well undertaken.

With all that has already been said with regard to the measures taken by the Government, and the direct importation from South America by Mr. Hasskarl, we think it not improper to say a little of what has been done by means of botanical gardens in the Netherlands, and by one private person, Mr. J. Willink, in the cause of this weighty matter, although those endeavours alone would not, in our opinion, have attained the object of the importation.

From the Botanical Garden at Amsterdam, the Professor Miquel, sent several Quinquina plants to Java. The results of the sending out of a Quinquina tree to Java in 1847, under the name of *Cinchona alba*, were very favourable. This tree, after having blossomed at Java, was called there *Cascarilla Muzonensis*, Wedd., or *Cinchona Muzonensis*, Gaud. Mr. Teysmann occupied himself with the management of this tree, which is a shrub, and quickly obtained from it more than a hundred plants.

To promote the chemical investigation of this sort of Quinquina, a few branches were sent to Mr. Rost van Tonningen, then apothecary at the Government Laboratory at Batavia; an analysis of which, on account of the small quantity of bark, was not easy. There was no Quinine in it, but a resin which unmistakably had the smell of

Quinquina resin, and deserved further inquiry as soon as a larger quantity of the bark should be obtained. He determined to make a second analysis, when the trees should be older, and he should have a larger quantity of the bark.*

We remark here, that till now it is not known at what period the alkaloids develope themselves; and we may expect that a further analysis of the bark of this sort, furnished by the justly-celebrated Botanical Garden of Amsterdam to Dutch East India, will afford us a new subject of information. We may not omit to mention that, for our chemists in Dutch East India, a new field of inquiry is opening, which may be of great importance to the very difficult, and as yet imperfect, chemical history of Quinquina barks.

From the Botanical Garden at Amsterdam, besides the exports made by order of the Minister, plants of *Cinchona Calisaya* were successively sent to East India,—as, in April, 1851, six plants; December, 1851, three plants; July, 1852, four plants. Mr. Willink, of Amsterdam, has also sent once or twice to Java, and thereby has shown his real interest in the good cause.

In the Botanical Garden at Paris some plants of the *Cinchona Calisaya* had grown up from seeds, sent by Mr. Weddell from South America; part of these were sent to Algiers, the rest were kept at Paris. In 1851, I saw two plants in one of the green-houses, which, I was assured, were the only ones left. These, as I guess were from 2 to 2½ feet high, and were in a healthy state. It would have been indiscreet to have asked for one of those two plants; I learned however that there was one at Messrs. Thibaut and Ketelière's, which seemed to me the same. This plant was conceded to me, and was sent from Paris to Leyden on the 21st of July, 1851. It grew luxuriantly here, and in a few weeks attained a length of 75 inches; it was sent by the Minister's orders, in an apparatus expressly made for it, to Java, on the 1st of December, 1851.

A letter from Batavia, 21st April, 1852, informed me that what I had sent had succeeded; for which, it appeared, that the minute care and the particular form of the apparatus were to be thanked. A few slips were immediately taken from this little tree; and the preservation of the plant was ensured, if unfortunately the chief stem should wither, for which, at first, there was some fear. The slips grew, and the tree also was preserved, to which its transplantation to Tjipannas certainly contributed.

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* The result of the inquiry of Mr. Rost van Tonningen was published in the Nat. Tydschrift (Batavia, 1852).

The last advices from East India concerning this plant, sent from the Botanical Garden, stated that very favourable expectations were formed of it, and that it had already attained a height of 5½ feet. Will the cultivation at Java succeed? Will the soil, the air, the light, the degree of warmth, of dampness, and other atmospheric relations, lastly, will the particular situation, suit the culture? Will the plant there find, in a word, all that it finds in its native soil that is necessary for its development in its normal state, and there everything to form all that which makes it the most valuable of all medicinal substances that the earth anywhere affords?

Of no new agricultural undertaking is the result to be considered as certain. The whole system of agriculture consists but in the exchange or transplantation of plants from one *place* to another. This holds good for the agriculture of all Europe, and we may say the same (as far as we are acquainted with them) for the other parts of the world; but this is particularly the case with the culture in tropical districts, and with European civilization in other parts of the world. The numberless host of crops of economical or technical nature belong, rarely, or never, by nature, to the lands in which we see them raised.[*] But those cultivated plants are just the most useful of the whole earth. We seek and find at last, without difficulty, all the circumstances that they require, if the plants are not wholly unfit for the change of air and soil, which quickly appears. Many plants for the commerce of Java, whose produce, that of some at least, brings large sums annually to the treasury, are not indigenous to that beautiful country, but have been brought to it from elsewhere,—Coffees from Arabia, indigo from Southern Africa, cinnamon from Ceylon, vanilla and nopal from Mexico, tobacco from America, rice from China and Japan, etc. Of some others the origin is no longer to be known. Other plants were originally there, but specimens of them have also been imported from other places, and they all succeed excellently. To expose all this in detail would be to communicate things already known.[†]

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[*] Von Humboldt (and we cannot produce a greater authority) says in his Essay 'Sur la Géographie des Plantes,' p. 27: "L'homme, inquiet et laborieux, en parcourant les diverses parties du monde, a forcé un certain nombre de végétaux d'habiter tous les climats et toutes les hauteurs; mais cet empire exercé sur ces êtres organisés n'a point dénaturé leur nature primitive. La pomme-de-terre, cultivée à Chili á trois mille six cents mètres de hauteur, porte la même fleur que celle que l'on a introduite dans les plaines de la Sibérie. L'orge qui nourrissait les chevaux d'Achille était sans doute la même que nous semons aujourd'hui. Les formes caractéristiques des végétaux et des animaux, que présente la surface actuelle du globe, ne paraissent avoir subi aucun changement dequis les époques les plus reculées," etc.

[†] Humboldt says (p. 27), "C'est ainsi que l'homme change à son gré la surface du globe et rassemble autour de lui les plantes des climats les plus éloignés. Dans les colonies Européennes

The Island of Java must be considered as having not high alone, but also low temperature, and different climates, even if it be not known by experience. On one and the same island grow cocoa-palms and species of oak; from its plains to the different elevations are found all the varieties of vegetation which are met with, from the equator to the temperate zones. The plains of Java furnish the tropical flora in all its varieties; and the heights, table-lands, and mountain-tops, the floras of Southern and Middle Europe. The plains of Europe present many floras agreeing with that of the Java mountain-tops, which are 9,000 feet higher.

The progress of our knowledge of the geographical propagation of plants, and of that propagation in connection with the knowledge of the physical constitution of countries, offer a vast field for enterprise in the culture and transplantation of plants, which may sometimes be brought from distances of thousands of miles.

The situation of many of the Quinquina districts being analogous to the geographical breadth of Java, must not be lost sight of. If this island does not present a like temperature in respect to the division of the quantity of sunlight, that mighty spur to vegetation, it will however give some analogy.

There exists at Java a principal requisite, which is of the greatest importance, and which almost warrants success. It is this: a good result to the transplantation of the Quinquina-tree from its native soil to a foreign land, can only be expected if (except conditions of less weight) one principal condition be fulfilled, namely that the trees be not planted in any country beyond the tropics; as only in the tropics does a temperature sufficiently even and unvarying last during the whole year, and by which the free development of the Quinquina-tree is made dependent by nature, as it appears in the geographical extent of those trees in Bolivia, Peru, Ecuador, New Granada. For this reason, the countries without the tropics, as Algiers or the Himalaya Mountains, could never serve for the culture of the Quinquina-tree, because they lie without the tropics, and the difference in the temperature of winter and summer is too great to suppose that trees that have been used to an even temperature through the whole year, would thrive there. Similar elevations, with a climate constituted as nearly as possible alike, having the same variations by day and night, are to be found. On the

des deux Indes un petit terrain cultivé présente le café de l'Arabie, la canne à sucre, de la Chine, l'indigo de l'Afrique et une foule d'autres végétaux qui appartient aux deux hémisphères." Others think indigo an Indian plant, although from the different information and opinions we may deduce that the matter is uncertain.—See Roxb. Fl. Ind. iii. 379; Wight and Arn. Prodr. p. 202; Royle, Ill. Himal. t. 195; Alph. de Candolle, Geogr. Bot. ii. 154.

mountains of Java, floras similar to those of the Quinquina-woods of Peru, may indicate the way, the place, the soil probably, where the Quinquina may be cultivated with good success.

In the opinion of Dr. Junghuhn, the elevation for the culture of the Quinquina is to be found at 5,000 and 6,000 feet, or even higher, particularly as we can with confidence assert that, in America, experience has taught us that those sorts which are met with in the lower stations produce less Quinine, and are used by the Cascarilleros only to mix with the better barks.

The experience at first acquired should plead for the correctness of the assertion of many Dutch naturalists, who have frequently raised their voices in this important cause, and for the merited confidence which was reposed in their opinions by the present Minister for the Colonies, M. Charles Pahud, under whose direction, doubtless to his own satisfaction, this matter was begun and has been so far successfully carried out; indeed the culture is already begun, as we think we have established in this communication; but particularly by advices from Java, by which we are informed that the culture of the Quinquina is so far advanced that they are of opinion that it is *impossible for it to fail.* These foreign plants have been so acclimated, multiplied, raised from seeds, planted out, and all with such good success, that the Quinquina plantation is reported as being in a very flourishing state.

We are convinced that unless great and not to be foreseen calamities befall them, we shall in a few years see Quinquina plantations at Java yielding the best sorts of Peru and Bolivia. The number of trees which may be raised in a few years is incalculable; but if we take for the basis of our calculation, the fact that a small tree, which arrived at Java three years ago, is now five feet and a half high, and has given off sixty striplings, then, in a few years, by a proportionate continuation of the culture, the number of trees will be increased to millions.

Thus we have succeeded in carrying out a matter in which the whole human race has an incalculable interest, and which was undertaken, not for the Netherlands alone, from thirst for gain or commercial speculations, but for the real benefit of mankind. We flatter ourselves that the Netherlands, on this account, may reckon on the approbation of the whole civilized world.—(*Hooker's Journal of Botany, October, and November,* 1856.)

Monthly Proceedings of the Society.

(Wednesday, the 9th January, 1856.

W. G. Rose, Esq., Vice-President, in the chair.

The proceedings of the last Monthly General Meeting having been read and confirmed, the Chairman announced that this being the Anniversary Meeting, the election of Officers and Council for the current year should be entered on. The Members accordingly proceeded to the ballot, and Mr. S. H. Robinson and Baboo Rajendralall Mittra, who were appointed Scrutineers, reported the result to be as follows :—

President.—Sir Arthur Buller.

Vice-Presidents.—Mr. W. G. Rose, Baboo Ramgopal Ghose, Mr. A. Grote, and Rajah Pertaup Chunder Sing.

Secretary.—Mr. A. H. Blechynden.

Council.—Baboo Peary Chand Mittra, Mr. C. A. Cantor, Mr. S. Douglas, Baboo Shib Chunder Deb, Mr. B. Warwick, Mr. W. Blundell, Mr. J. Church, Mr. W. Haworth, Baboo Gobind Chunder Sen, Dr. T. Thomson, Mr. J. Agabeg and Mr. S. P. Griffiths.

The revision of the Standing Committees was next taken into consideration. On the recommendation of the Council the names of the following Members were added to the Committees in which there were vacancies; namely, to the Coffee and Tobacco Committee, Mr. G. Ackland ; to the Committee for implements of Husbandry and Machinery, Colonel Hugh Fraser ; and to the Floricultural Committee, Dr. Thomson, Messrs. S. P. Griffiths and E. Wingrove. On the same recommendation a new Committee was appointed, called the "Garden School Committee," composed of the following Members :—The Rev. J. Long, Mr. Grote, Rajah Pertaup Chunder Sing and Baboo Peary Chand Mittra. On the motion of Mr. S. H. Robinson, another Committee was added to the list, called the "Tea Committee," composed of the following gentlemen :—Messrs. Francisco Pereira, Joseph Agabeg, C A. Cantor and T. E. Carter.

The annual Report from the Council was next submitted.

It was moved by Mr. Robinson, seconded by Mr. Carter and *resolved,* that the Report be received.

The business of the ordinary monthly meeting was then proceeded with, and the following gentlemen, who where proposed at the meeting in December, were duly elected Members, viz. Lieutenant E. W. Dunn; Lieutenant R. Stewart; Messrs. W. Foley; John Parry; Richard Lauder and John Capper.

The names of the following gentlemen were submitted as candidates for election :—

Mr. Frederick Jennings, Calcutta,—proposed by Mr. C. A. Cantor, seconded by the Secretary.

T. C. Trotter, Esq., Civil Service, Calcutta,—proposed by Mr. A. Grote, seconded by Mr. Cantor.

H. V. Bayley, Esq., Civil Service, Hooghly,—proposed by Mr. Grote, seconded by Mr. Cantor.

J. H. Bridgman, Esq., Gorruckpore,—proposed by the Secretary, seconded by Baboo Peary Chand Mittra.

Baboo Goopeekrist Gossain, Serampore,—proposed by Mr. Joseph Agabeg, seconded by Baboo Peary Chand Mittra.

W. T Denman, Esq., Solicitor, Calcutta,—proposed by Baboo Gobind Chunder Sen, seconded by the Secretary.

The following presentations were announced :—

1. Italian Irrigation (2 Vols.) by Captain Baird Smith, with a set of Maps and Plans illustrative of the work. *Presented by the Government of Bengal.*

2. Half-yearly Report of the Committee of the Bengal Chamber of Commerce. *Presented by the Chamber.*

3. Journal of the Asiatic Society of Bengal, No. 6, of 1855. *Presented by the Society.*

4. Three cases of Plants, from Moulmein, consisting of Orchids, Mangosteens, Doorian, and other fruit trees. *Presented by Sir A. Bogle.*

5. A small collection of Orchids. *Presented by R. W. G. Frith, Esq.*

6. A case of Orchids from Assam. *Presented by Mr. C. J. Simmons.*

7. A few Orchids from Cherra. *Presented by C. K. Hudson, Esq.*

8. Half a bushel of Ceylon Coffee seed. *Presented by G. H. W. Thwaites, Esq.*

9. A large supply of tea seed raised in Upper Assam from China stock. *Presented by the Rev. E. H. Higgs.*

10. A small quantity of China Aster seed from Kashmere. *Presented by Captain W. H. Lowther.*

11. Specimens of fibres of plantain, pine apple, *Hibiscus* and Shaws of sorts from Arracan. *Presented by Lieutenant F. W. Ripley.*

12. Sundry specimens of fibres and rope prepared at Berhampore; also musters of sun-flower and other oils. *Presented by M. Betts, Esq., Honorary Superintendent Branch Society's Garden.*

The fibres from Arracan and Berhampore, were referred for report to the Hemp and Flax Committee.

13. Specimens of fibre, rope and bagging prepared in the Moulmein Jail from a description of Mallow common in that province. Forwarded for exhibition by the Bengal Chamber of Commerce.

A report was read from the Nursery Garden Committee of a meeting held on the 28th December. The Committee suggest that a small sum (Rs. 29) be granted for the erection of a range of sheds for the accommodation of a certain portion of the establishment, and for the widening of one of the walks. They also recommend that a monthly sum of Rs. 5 be allowed for the services of a Native Doctor; and an increase of Rs. 4 per mensem to the sum of Rs. 10 at present allowed to the writer attached to the Gardener's Office. "The Committee next took into consideration the subject of the Garden School. They have to report that there are at present only four boys from the country in addition to the 12 boys belonging to the villages adjacent to the garden. The four boys in question are Christians belonging to the Kishnaghur mission, and were sent by the Rev. Mr. Long. Mr. Long placed eight extra boys originally in the School, but four of these being found beyond the pliable age of boyhood, and being, moreover, in the habit of absenting themselves, it was found necessary to dispense altogether with their attendance. The circular attached to the Committee's report of 2nd April, 1855, has since been widely distributed over the country, but has not so far had the desired effect, though more than one Mofussil member has promised to endeavor to procure boys for the school. In the meantime the Committee think it desirable that an attempt should be made to teach the children of the Dhanger coolies now employed in the Garden. These men are willing to send for their children to live with them in the houses provided for them in the garden, if the expense of their food and clothing be also met by the Society. The Committee are of opinion that 12 of these boys should be entertained as a beginning, the allowance for them being the same as for the village school boys, viz., ranging from Rs. 1-4 to Rs. 2 per mensem. The age of the boys should not exceed 12, nor should they be younger than nine." The Committee append to their report a favorable notice from the visitors (the Rev. J. Long and Baboo Peary Chand Mittra) on the present state of the school. The Committee report, lastly, that the stock of sugar-canes, amounting to about 12,000, is now ready for cutting, and that they have authorized its sale at from 5 to 3 Rs. per hundred to subscribers, according to size, and from 6 to 4 Rs. to non-subscribers.

Resolved.—That the Committee's Report be adopted.

The Gardener's Monthly Report was submitted. Mr. McMurray gives the result of his sowings of Carter's English flower seeds, showing that 76 out of 82 sorts have germinated most freely: those that have not yet vegetated are Violet, Lobelia, Larkspur (2 kinds) Sparaxis and Martynia. The late trial sowings of the Scotch vegetable seeds have proved equally as unsatisfactory as those made in August last. The Dutch and Riga flax seed has germinated freely in the open ground, and the crop looks well at present. The valuable species of *Mesembryanthemum*, recently presented to the Society by Captain C. B. Young, has germinated freely. The Gardener next alludes to various contributions during last month, and concludes by intimating that the several kinds of tuberous rooted crops cultivated during the rainy season, such as arrow-root, tapioca and yams of sorts, are now fit for distribution to Members.

On the recommendation of the Council it was agreed that the first show of vegetables, fruits and flowers of the season be held in the Auckland Garden on Friday, the 25th of January, the second in the first week in March, and the third in the first week in April.

Submitted a letter from Messrs. P. Lawson and Son of Edinburgh, advising the despatch of a supply of *Agricultural* seeds, which had been ordered from them for distribution among the Cossiahs.

Resolved—That as it would appear from the letter of Mr. C. K. Hudson, that the quantity now received is more than sufficient for experimental distribution to the Cossiahs, a portion be placed at the disposal of Dr. Campbell, Superintendent of Darjeeling, for distribution among the hill people, and a portion transferred to Sir A. Bogle for trial at Moulmein and its vicinity.

(*Thursday, the* 14*th of February,* 1856.)

W. G. Rose, Esq., Vice-President in the chair.

The proceedings of the last meeting were read and confirmed.

The gentlemen proposed at the last meeting were duly elected Members, viz:—

Messrs. F. Jennings; T. C. Trotter, Civil Service; H. V. Bayley, Civil Service; J. H. Bridgman; W. T. Denman and Baboo Gopeekrist Gossain.

The names of the following gentlemen were submitted as candidates for election:—

Captain Grovernor Kirby, Artillery, Bareilly;—proposed by Mr. Arthur Grote, seconded by Mr. C. A. Cantor.

J. G. N. Pogose, Esq., Zemindar, Dacca;—proposed by Mr. Joseph Agabeg, seconded by Baboo Peary Chand Mittra.

Captain H. Hopkinson, Commissioner of Arracan;—proposed by Captain John Eliot, seconded by the Secretary.

Lieut. E. J. L. Twynam, Executive Officer, Arracan;—proposed by Lieut. F. W. Ripley, seconded by Mr. Cantor.

Baboo Oboychurn Goho, Calcutta;—proposed by Mr. Agabeg, seconded by Mr. Haworth.

H. M. Davis, Esq., Civil Surgeon, Noacolly;—proposed by Mr. W. G. Rose, seconded by the Secretary.

David Horn Freeland, Esq. (firm of John Herriot and Co.);—proposed by Mr. Haworth, seconded by Mr. S. Douglas.

Honorary Members.

On the recommendation of the Council, the names of the following gentlemen were proposed as Honorary Members:—

Sir Lawrence Peel, in acknowledgment of his encouragement of Agriculture and Horticulture, and for services rendered to the Society.

Robert Fortune, Esq., in acknowledgment for services rendered to the Society.

The following contributions were announced:—

1. Selections from the Records Government of India, No. 9 and Supplement to No. 8. *Presented by the Government of India.*

2. Selections from the Records Government of Bengal, No. 23. *Presented by the Government of Bengal.*

3. Memoirs of the American Academy of Arts and Sciences, Vol. V. Part I. *Presented by the Academy.*

4. Report of the Bombay Chamber of Commerce for 1854-55. *Presented by the Chamber.*

5. Three Reports from the General Board of Health, respecting the practical application of sewer water and town manures to Agricultural production. *Presented by the Government of Bengal.*

6. A small quantity of indigenous Assam tea seed. *Presented by T. E. Carter, Esq.*

7. Dahlia seed of 18 kinds, collected on Mount Aboo. *Presented by Captain J. Hall.*

8. Some Gurhwal onion seed, and seed of a very fine description of capsicum. *Presented by C. Horne, Esq.*

9. A few French onions and potatoes. *Presented by H. F. Butler, Esq.*

10. A bag of white Linseed. *Presented by J. B. Williams, Esq.*

11. A collection of Chinese peas and beans. *Presented by R. Fortune, Esq.*

12. A further supply of tubers of the Chinese potato. *(Dioscoreas batatas.) Forwarded by R. Fortune, Esq.*

Mr. Fortune states that these yams were procured near Ningpo, and differ from the Shanghai kind formerly sent to the Society.

13. A number of Sylhet orange plants. *Presented by T. P. Larkins, Esq.*

14. Five seedlings of rare plants. *Presented by B. Warwick, Esq.*

15. Grafts of a mangoe and guava of a very superior description from Patna. *Presented by W. Masters, Esq.*

16. Three cases of useful and ornamental plants from China. *Forwarded by R. Fortune, Esq.*

17. Specimens of gamboge (*Garcinia pictorea*) from Coorg; of gum from *Euphorbia Cutteemundoo*, from the Northern Circars; and of Catechu as exported from Travancore and Mangalore. *Presented by Dr. Hugh Cleghorn.*

18. Specimens of paper manufactured from various materials. *Presented by Colonel Jenkins, Dr. Riddell, and J. H. Bridgman, Esq.*

19. Specimens of the Chinese white wax insect. *Presented by R. Fortune, Esq.*

Provision of Vegetable, Flower, and other descriptions of Seeds for 1856.

Read the following Report of the Garden Commitee:—

"Your Committee having taken into consideration the provision of seeds for 1856, beg to report as follows:—

Vegetable, Cotton and Tobacco seeds from North America.—The small consignment of seeds received last year from Mr. Landreth having given general satisfaction, it was recommended by the Council in November last, that a consignment, similar to that ordered in 1854, be indented for, for the next season; this recommendation having been adopted by the General meeting, an order was transmitted by the overland mail of the 23rd November to the extent of $1240, which will admit of a general distribution to all the Members.

Vegetable seeds from the Cape.—The great bulk of the seeds forwarded last year by Messrs. Villet and Son, having been pronounced equal to the importations of former years by Mr. Scott, Head-Gardener of the Botanic Garden, Mr. Dougherty, Superintendent of the Barrackpore Park, and by the Society's Gardener, the Committee are prepared to recommend that another order be given for the same quantity. They would, however, suggest that Messrs. Villet be directed to give a larger quantity of seed of certain descriptions more especially of asparagus and artichoke;—that they send both red and white celery, instead of one kind only, also seed of white Lisbon onion and Brussell's sprouts if available, and a larger assortment of potherbs.

Flower seeds from England.—The reports on the quality of the flower seed, received last year from Mr. Ainsworth, the successor of the late Mr. Carter, being altogether favorable, the Committee propose that he be entrusted with another order of equal extent, on the understanding that if the seeds do not prove equally as good as those sent by Mr. Carter, the Society will not renew the order. Mr. Ainsworth might be directed to send a quantity of onion and Brussels sprouts, as the Cape seedsmen may fail to send them. A quantity of cauliflower seed. might also be obtained from Cawnpore, and onion seed from Bombay and Sreenuggur. The Committee think it would be desirable at the same time to ascertain from some other seedsmen (say from Messrs. Rollisson, of Tooting,) on what terms they would be prepared to execute the

Society's orders, and that they be requested to send a small assortment, not exceeding twenty rupees in value, for trial in the Society's Garden.

Vegetable seeds from Edinburgh.—The trial consignment of last year from Messrs. P. Lawson and Son, having unfortunately proved so decided a failure, the Committee cannot, at present, recommend a renewal of the order. At the same time they are not prepared to throw the blame of furnishing bad seed on so respectable a firm as Messrs. Lawson ; indeed they conceive that it is probable the seeds may have suffered considerably from deep stowage, owing to the carelessness of the Society's London Agents, Messrs. Grindlay and Co., to whose care the boxes were sent from Edinburgh for shipment. They would recommend, with the view of giving the seeds another trial, that it be suggested to Messrs. Lawson to send two small assortments next season, at their own expense, one by overland route, the other by one of the quick sailing vessels, which are now constantly coming to this port direct from Glasgow.

Seeds from the Horticultural Garden at Ootacamund, Neilgherry Hills.—The Committee have had the perusal of a letter, from Mr. Scott, Head-Gardener of the Botanic Garden, to Dr. Thomson, submitting for the consideration of the Society, the Ootacamund Garden as a desirable locality from whence to obtain good vegetable seeds. The following is extract of Mr. Scott's letter :—

" Latterly my public duties have led me to a careful examination of the subject of European vegetable seeds, and I have given my preference to Ootacamund as a source of supply. In a private communication recently received, Mr. McIvor writes, that Ootacamund has exceeded his publicly expressed expectation—that for the last two years he has received very satisfactory reports on the vegetable and flower seeds sent out by him to stations all over India, that his resources in hand are ample, but as that branch of the Institution must be self-supporting, the supply of seed must consequently be kept within the limits of demand."

Without entering, at present, into the question, as to whether seeds grown in the hill stations of India are likely to be found as true to their kinds, and as certain in their produce, as those obtained from England or North America, the Committee think it very desirable that a trial should be given to the seeds alluded to by Mr. Scott, and would therefore recommend an application to the Superintendent of the Ootacamund Garden for a good collection of all the sorts of seeds raised by him,—both vegetable and flower—(say six packets of each) and to ascertain what quantity he would be able to supply of each in one season.

Applications from Members and Station Gardens for seeds.—The Committee have had under consideration an application from Sir A. Bogle, referred to them by the Council for twenty-five packets of vegetable seeds—American and Cape—*at prime cost* for distribution among the Chinese and other Gardeners at Moulmein and the vicinity ; and recommend that this request be complied with, the seeds being required solely with the view of promoting horticultural improvement. It having also been brought to the notice of the Committee, that for the last three or four years, seeds have been supplied in rather large quantities, *at prime cost,* for the use of various Station Gardens, they beg to suggest that in future only one packet be given for these Gardens at prime cost, from each consignment, and that if any quantity beyond that be required and is available, it be charged at the same rate as to a non-subscriber.

Flax Seed.—Though the flax seed forwarded last year by Messrs. Lawson and Son, was received rather late in the season, the result of the sowings in the Society's Garden and elsewhere is sufficiently encouraging to warrant the Committee in recommending that double the quantity, both of Riga and Dutch seeds, be ordered—namely fifty bushels - and to reach this in all September—the object of this indent being the same as the last, namely to ascertain if the plant can be successfully raised in Bengal for the sake of its fibre.

Lastly, the Committee having taken into consideration a letter referred to them by the Council from E. F. Lautour, Esq, suggesting that the Society obtain a large quantity of agricultural seeds, are of opinion that it would be advisable to await the reply to the Society's letter on the subject to the Hon'ble the Court of Directors; in the meantime they would suggest that Mr. Lautour's attention be drawn to the fact that something has been done and more is proposed to be done in the agricultural branch ; Cotton and Tobacco seeds having been already ordered from North America, a quantity of seeds of field crops having been recently received from Messrs. Lawson, a supply of potato seed being daily expected, and an additional quantity of flax seed recommended, as above, for purchase.

In conclusion, your Committee beg to subjoin a memo. of the probable total cost of these consignments for next season, amounting in the aggregate to Rs. 7,180 exclusive of freight, insurance, &c. exceeding by about (two hundred) Rs. 200, the cost of the consignments of 1855.

MEMO.

		Rs.
For Vegetable, Cotton and Tobacco, Seed from North America,	$ 1240	2,480
For vegetable seeds from Cape of Good Hope,		2,000
For flower seeds from England,		2,300
	Total, Rs.	6,780
Flax seed,		400
	Grand Total, Rs.	7,180

(Signed,) W. G. Rose.
„ S. Douglas.
„ C. A. Cantor.
„ J. Agabeg.

Proposed by Mr. T. E. Carter, seconded by Baboo Peary Chand Mittra, and *Resolved*— that the Report of the Committee be adopted.

Horti-Floricultural Exhibitions.

Read the reports of the Judges respecting the show of vegetables, fruits and flowers held on the 25th January:—

Horticultural.—In submitting the annexed list of prizes awarded at the first Horticultural Exhibition of 1856, the Judges beg to offer the following remarks:—

First, in regard to Foreign Vegetables.—The collection was on the whole very satisfactory. The cauliflowers which occupied a prominent place, were abundant and well represented, the heads being large, well-formed and close. Of Scotch kale the competition was not great but those submitted, were of good quality. The sulphur and white broccoli were abundant and well grown. Cabbages of six kinds were also well represented, viz. Savoy, Battersea, drum head, early York, sugar-loaf and red. Of endives the green curled and broad leaved were nicely grown, well blanched and very abundant. The same remark is applicable to spinach (prickly, seeded and broad-leaved) each kind was green, young and tender. Of lettuces four kinds were exhibited, viz. cabbage, Paris cos, black and white seeded cos; all these were as well raised as last year, and the quantity equally as large. The celery was indifferent, still a few good heads of both red and white raised from seed this season were exhibited: celery raised from offsetts was abundant, but, as usual, of an inferior quality. The white and purple nole-kole were very abundant, some of good quality, and others overgrown. Of turnips four kinds were exhibited, viz. white flat stone, yellow stone, large white globe and red; and five kinds of carrots the short horn, Altringham, large yellow, long red and Persian black, the two former kinds were of very good quality for table use, the latter, as usual, were abundant and well represented. The turnip-rooted and long red beet-root were plentifully exhibited and of good quality. Of mangold-wurzel several good baskets were brought forward. Onions, leeks and chives were good and plentiful. The turnip-rooted and long radish were abundant, young and tender. Two baskets of horse-radish were shown in good order. The potatoes were in several stages of maturity and in abundance; the late deep eyed and early full eyed were shown in a matured state and of good quality; two kinds of red potatoes were also exhibited in a young state. The Windsor and long pod beans were more abundant and in better condition than is usually the case at this season of the year; the red and white French beans were very abundant and of good quality, the Lima bean was shown in small quantities but of good quality. Several varieties of peas were submitted, among which were recognizable imperial blue, Prussian blue, marrowfat, early frame, and sugar; the whole well filled, tender, and good flavoured. Several kinds of squash were exhibited. The asparagus was indifferent, but it is too early in the season for this vegetable. Globe artichoke was well represented ; Jerusalem artichoke was also shown in small quantities but of good quality. Of water-cress several specimens were shown, as also pot-herbs, such as mint, marjoram, thyme, sage and parsley.

Of *Native Fruits* there was a good display, viz. pummelows, sapotas, oranges, pine-apples, long and round plums, pomegranates, guavas, loquats, bullock's hearts, roseapples, plantains, kamarunga, papias, bale, custard-apples, Cape gooseberry, cocoanuts, water-melon, &c. ; the pummelows and guavas were particularly fine.

The *Native Vegetables*, as usual at this season of the year, were very abundant and well represented.

Mr. Stalkartt exhibited a bundle of green flax in pod, raised from Riga seed, received from the Society. This flax was about 3½ feet in height, in straight single stems : the seed had been purposely sown thickly,—about 20 seers to the beegah,—the object being to raise the plant, not for seed, but for the sake of the fibre. Several varieties of sugar-cane were exhibited, amongst them one bundle raised from Singapore stock, which was considered as well grown.

About 200 mallees were in attendance ; prizes to the extent of Rs. 300 and 4 bronze medals were awarded to 53 ; the medals were given for the best specimens of celery, turnip, potato, and Winsor bean.

Wm. G. Rose.
S. Douglas.
Peary Chand Mittra.
Joseph Agabeg.

Floricultural.—The Judges have but a few remarks to offer respecting this show. Though the display was greater than at the January show of 1855, it was not equal to the exhibitions of previous years held in the same month. The produce of 25 gardens was brought forward, and prizes to the extent of Rs. 101, were awarded to 18, as per list annexed in detail.

Among the few plants meriting notice, were Camellias, the collection of which from the gardens of Messrs. Francisco Pereira, Hay Stewart and others, was greater than any yet exhibited : there was a tolerably fair show of roses, though rather too late in the season for them ; a few well grown plants of *Astrapœa Wallichii* and *Habrothamnus fasciculatus* were submitted ; and among the few novelties were plants of *Forsythia viridissima*, *Tropœolum Lobbianum* and *Cypripedium* species, from the gardens of Baboo Brindabun Chunder Mittra, Messrs. Warwick and Bartlett. The Society's Garden contributed several well grown plants, *for exhibition only*, including some fine specimens of *Euphorbia Jacquiniflora* and *Abuliton Bedfordianum.*

The Judges have again to bring to the notice of the Society, the kind assistance rendered by Major Robertson, Commissary of Ordnance, Lieut. Alexander Fraser, Offg. Garrison Engineer, and Messrs. Burn and Co., in the loan of tents, stands, &c., for the show. They have also to express their best acknowledgments to Colonel Hutchinson and the other officers of H. M. 35th Regiment, for the services of their Band. The Show was densely thronged with visitors.

A. Grote.
Benj. Warwick.
E. W. Wingrove.
Thomas Thomson.

It was resolved, on the recommendation of the Council, that the next show be held on Saturday, the 1st of March.

Nursery Garden.

The Gardener's Monthly Report was submitted. Mr. McMurray announces that the Scotch field vegetable seeds, recently received from Messrs. P. Lawson and Son, of Edinburgh, have yielded an average return of seventy per cent, which may be deemed a fair produce. He forwards a quantity of arrow-root and tapioca powder, of a quality equal to that of previous years, for distribution to Members. Mr. McMurray adds, "Several kinds of the fruit trees in the orchard, which have not previously borne any flowers, are this season producing an abundance of bloom, particularly the various kinds of mango trees under cultivation, from which it is to be hoped an abundant supply of fruit will be had in order to test their quality. The Avacado pears, peaches, pummelows, and lichee trees are also producing flowers in abundance, which no doubt will yield a good crop of fruit, if the weather continues favorable, and the heavy fogs keep away, for three weeks more, to allow the fruit to set." The Gardener alludes to various contributions during the past month, and remarks that all the China plants recently received from Mr. Fortune have, with one exception, arrived in excellent order. He concludes his report by stating that he has still on hand a few maunds of good yams to give away to Members, as also a few thousand of full sized sugar-canes, at the fixed scale of prices.

Discovery of the Tea Plant in Sylhet.

The Secretary submitted a letter to his address, of which the following is an extract, from T. P. Larkins, Esq., Magistrate of Sylhet, announcing the discovery of the tea-plant in his district:—" Herewith I enclose in a box a specimen and seed of the tea plant which I have much pleasure in informing you has been discovered growing abundantly to the South-east of my district. I also send in the same box a seed of the Cachar tea plant sent to me by Captain Verner, by which you will perceive that the tribe is the same. I have this day reported the circumstance to the Government of Bengal, and should be obliged by your making known the fact in Calcutta, should it be *actually* tea (of which I have no doubt) the leaves are also unmistakeable. I should also be glad if you would lay the specimen before the Society at their next meeting, as the discovery will be of such immense benefit to Government and the people of the country. The spot where the specimens sent were found is the Chandkhana Hills, Pergunnah Garasuttee, Zillah Sylhet, Thannah Latoo, close to the borders of Independent Tipperah, on the river Liegy, a branch of the river Simlah, which runs into the river Kuchna, which falls into the Swarree, a branch of the Soorma; it is situated as the crow flies 50 miles from Sylhet, or 2¼ days by native measurement. I am making local enquiries concerning the discovery, and will let you know more in a few days when I hope to be able to send you an entire tree, seed, flowers, and *all* complete."

The Secretary intimated that he had referred the specimens sent by Mr. Larkins to Dr. Thomson, who had pronounced them to belong to the true tea plant.

Materials for paper manufacturing.

Communications were read from Colonel Jenkins, Dr. Riddell and Mr. Bridgman on the above subject, accompanied by certain specimens of paper.

The white wax insect of China.

Read an extract of a letter from Mr. Fortune respecting the specimen of Chinese white wax insect alluded to among the presentations.

In another part of the same letter Mr. Fortune writes—"Enclosed is an account of the money spent for the Society, by which you will observe I have rather exceeded the amount placed to my credit. I hope, however, you will consider I have spent it profitably. My labours on account of the Society in China have now terminated, and I have only to express a hope that they have been considered worth the trouble taken by the Society in securing the sanction of Government."

Resolved.—That a special vote of thanks be accorded to Mr. Fortune for the time and attention he has so readily bestowed on the various requisitions made to him by the Society during the last three years of his residence in China; and that this meeting fully adopts the recommendation of the Council for the election of Mr. Fortune as an Honorary Member, in acknowledgment of his valuable services: further, that the best thanks of the Society be communicated to Government for having acceded to its request of allowing Mr. Fortune to devote a portion of his time for the collection of plants, seeds, &c., for its garden, and for obtaining information of an useful and interesting nature.

Communications on various other subjects.

The following letters were also read:—

1. From D. B. Lindsay, Esq., communicating his mode of growing mushrooms, of which some fine specimens were submitted at the last show.

2. From R. Sturrock, Esq., Secretary Chamber of Commerce, Dundee, acknowledging receipt of the bale of flax straw raised at Allyghur, and forwarded by C. Gubbins, Esq., and stating that he has taken the necessary steps for having it properly prepared, and promising, in due time, a report and specimen of the fibre, as requested.

3. From Messrs. Bates, Hyde and Co., Massachusetts, acknowledging receipt of the gold medal awarded for their cotton-cleaning machine, and expressing their gratification at "the beautiful manner in which it has been executed."

4. From Lieutenant F. W. Ripley, Kyouk Phyoo, applying for the specimen of Russia bast mat, presented to the Society by the Government of Bengal, to aid him in making one from the "Shaw Ne," which he proposes sending to the Society. Agreed that Lieutenant Ripley's request be complied with.

5. From Sir A. Bogle, intimating that the season is too far advanced to admit of his making any use of the seeds of field vegetables, &c., offered him; but that he will be glad to obtain a large supply of garden seeds at the proper time for sowing.

6. From E. A. Samuells, Esq., Cuttack, announcing the total failure of the Cape water rush seed sent to him in August last, though tried in various localities, which appeared suitable, and under various modes of sowing.

The Secretary stated that reports of the same nature had been received from various other members, to whom portions of the supply presented by Major Weller had been distributed.

Resolved.—That Messrs. Villet and Son be requested to send living plants of this valuable rush in a Ward's case, by the first opportunity, as also seeds placed in the soil.

For all the above contributions and communications the best thanks of the Society were accorded.

(*Wednesday*, 12*th March*, 1856.)

The Hon'ble Sir Arthur Buller, President, in the chair.

The proceedings of the last general meeting having been read and confirmed, the following gentlemen proposed on that occasion, were duly elected :—

As Honorary Members.

Sir Lawrence Peel, and Robert Fortune, Esq.

As Ordinary Members.

Captain Grovernor Kirby; Captain H. Hopkinson; Lieutenant E. J. L. Twynam; Baboo Obhoychurn Goho; Messrs. J. G. N. Pogose; H. M. Davis; and D. H. Freeland.

The names of the following gentlemen were submitted as candidates for election :—

G. C. Paul, Esq., Barrister-at-law :—proposed by Mr. C. A. Cantor, seconded by Mr. Joseph Agabeg.

Thomas Fraser, Esq., of Meerpore Factory, Pubna ;– proposed by Mr. W. F. Gilmore, seconded by Dr. Huffnagle.

His Excellency General the Hon'ble George Anson ;—proposed by Sir Arthur Buller, seconded by Mr. Grote.

J. F. Galiffe, Esq., Collector of Canal Tolls ;—proposed by the Secretary, seconded by Mr. T. E. Carter.

R. MacCrea, Esq., Commissariat Department, Thyet Mhew ;—proposed by Mr. F. Frost, seconded by the Secretary.

The following contributions were announced :—

1. Journal of the Royal Asiatic Society of Great Britain and Ireland, Vol. XV, Part 2. *Presented by the Society.*

2. Journal of the Indian Archipelago. Supplementary No. for 1854. *Presented by the Government of India.*

3. Indian Journal of Arts, Sciences and Manufactures. Parts 7, 8 and 9, and the Illustrated Indian Journal of Arts. Parts 1 to 4. *Presented by Dr. Hugh Cleghorn.*

4. A large yam measuring 2 feet in length, 1½ feet in circumference, and weighing 8 seers. *Presented by Captain H. B. Weston.*

The following is extract of Captain Weston's note regarding this yam :—

"The stock from whence this yam is derived was given to me about two years ago, (about the size of a Patna onion, but longer,) with some anemone and ranunculus and other bulbs. I planted it in a pot, where it grew to the bottom; not being able to get further, I suppose, the stem died. I took it out of the pot and found two about 9 inches long and 1 in diameter. I gave one to Mr. MacMurray. When mine began to shoot I planted it, and it has in one year reached to its present size. It was a seed when given to me, and I believe came from the Botanical Garden at Pondicherry. The yam appears to me to be of that beautiful sort grown in the Island of Fernando Po, noted for being very mealy. I saved a great quantity of seeds from this plant, half of them are at your service if you like."

It was agreed to transfer the yam to the Society's Garden, and to accept Captain Weston's obliging offer of seeds for distribution.

5. A small quantity of American dwarf beans, French peas, and potatoes *Presented by Mr. H. J. Butler.*

6. Specimen of "a species of Castor Oil plant." *Presented by K. M. Nicholson, Esq. of Goruckpore.*

The Secretary intimated that having informed Mr. Nicholson that the specimen in question had been pronounced by Dr. Thomson to be an accidental monstrosity of the common Castor Oil plant, that gentleman had, in reply, offered the following observations :—

" I have been duly favored with your kind letter of the 18th instant, communicating your intention of submitting the specimen of Castor Oil plant as a curiosity, at the next Meeting of the Society.

The specimen in question, may be, as Dr. Thomson remarks, an accidental monstrosity of the common Castor Oil plant, but I am inclined to think otherwise, for the following reasons. First, I have visited the spot whence the specimen was brought (viz. the small village of Ekrahwa, in the vicinity of the Catholic Mission at Chooree District, Chumparun,) where I found growing, outside a sugar-cane field, upwards of a dozen plants of the same kind. They attained an average height of 12 feet, were in full bearing, and the main trunk appeared remarkably succulent and healthy.

I may next mention, that the *common Castor Oil plants,* which stood side by side—forming the same continuous ridge, out side the field, did not seem in the least affected. The *stems were not flattened,* and exhibited *no signs of monstrosity.*

Lastly, the ryot, a respectable Brahmin, in whose field I saw the above, informed me that it was a *distinct 'jat'* or *species,* that he had with some trouble, procured a few seeds last year from a friend 20 miles distant in the Nepaul Terai, and that it was his intention during the present season to increase its cultivation.

I have been promised a small quantity of the seed when ripe, which if I succeed in getting, I shall with pleasure forward for the use of the Society."

7. Specimens of tubers and prepared powder of the "Atees" *(Aconitum heterophyllum)* sent to him by Mr. Sub-Assistant Surgeon Henning in medical charge of Oorai. *Presented by Captain W. H. Lowther.*

Captain Lowther states that his object in sending this valuable drug is to enable the Society to forward it to England for experimental purposes. The Secretary mentioned that Dr. Thomson, to whom he had sent the tubers, had recognized them as belonging to the true " Atees ;" and had offered to send the powder to "Mr. Daniel Hanbury, an enthusiast in drugs, who will experiment on it."

Dr. Thomson's kind offer was thankfully accepted by the Meeting.

The following are Mr. Henning's remarks regarding this drug and his mode of administering it :—

"The above-named substance has, for now nearly eighteen months, been used by me as a substitute for quinine in the cure of agues and other fevers, and the success I have had with it has been really wonderful and most gratifying. The dose of the *Atees* is from 20 to 30 grains every 3 or 4 hours, given in the form of powder. I usually premise with an emetic, unless there be great prostration, and after its operation begin with the *Atees,* and which is given irrespectively of the presence of pyrenia. If the bowels are easy I begin with the *Atees* at once. Should the fever prove to be remittent or continued, then to each 10 grains dose of *Atees* are conjoined 4 grains of calomel, and administered every 3 hours, until the form of fever change, or the gums become slightly touched. I never carry the mercury to ptyalism, but am satisfied with mercurial fœtor provided that it can be detected before the tenderness of gums. In fevers fully ascertained to proceed from malaria, the *Atees* has been administered by me in the direct ratio of their intensity. *Atees* produces none of the unpleasant head symptoms which are generally occasioned by quinine, and in this respect is superior to quinine, because it can be given in those cases, when from idiosyncracy, irritability of the stomach, vertigo, tumilus, or other cerebral disturbance, quinine is contra-indicated. I have successfully treated and cured nearly 400 cases of fevers of every kind, and every grade, many of the cases were very indomitable, and in some of them quinine and arsenic had previously failed. I am certain that the like success will attend every person who may be led to use it."

8. A roll of sacking made from the "Shaw Ne" bast in the Akyab Jail, which sells readily at Akyab at Rs. 20 per 100 bags. *Presented by Lieutenant F. W. Ripley.*

9. Specimen of the fibrous bark of a tree found in the jungles of the Gorruckpore district. *Presented by J. H. Bridgman, Esq.*:—

"I send to-day, by dâk banghy,"—writes Mr. Bridgman —"a small parcel of the fibrous bark, which I mentioned that my neighbour Mr. Peppe had discovered in the jungles. This is not nearly so white as some that I have seen at a former time. I have not seen the tree from which it has been taken, but Mr. Peppe tells me that this substance forms the inner bark, between the wood and the outer bark, and is often to be found of an inch or more in thickness. The tree when cut down throws out shoots in a single season of several feet in length lined with this material. It does not appear to me to have sufficient strength for the purposes of cordage, but might answer very well for paper. I understand from Mr. P. that a year or two ago he sent a large quantity to Messrs. Watson and Co., of Clive Street, and that he believes Mr. Watson sent it to a paper manufacturer in Scotland to experiment upon. It would be very interesting to ascertain what the result has been."

The Secretary announced that he had communicated with Messrs. Watson and Co., who had kindly informed him that the report of the gentleman to whom this material had been sent, (who has several factories at Dundee) was to the effect that it was not well adapted to any of their manufactures; that it appeared to be the fine rind of some tree like the material of which the Russian mats are made, only much finer: and that it is too much of a woody nature for dressing and spinning by machinery.

The Secretary observed that the material in question was very similar to the "Yuseng Shaw" of Arracan, (*Sterculia colorata?*) recently received from Lieutenant Ripley. He had requested Mr. Bridgman to oblige the Society with specimens of the plant for examination.

10. Specimens of flax straw and fibre from Dutch, Riga, Saharunpore and Patna seed. *Presented by John Stalkartt, Esq.*

Mr. Stalkartt mentions that these specimens have been raised at Goosree, in the neighbourhood of Calcutta, from seed received from the Society, and sown in the early part of December, a month later than the proper time; still he considers the result to be satisfactory and encouraging. Among the specimens of prepared fibre, is one *which has not been steeped at all;* it was pulled in the middle of the day, dried in the sun, and crushed and manipulated at sunset: to this flax Mr. Stalkartt is inclined to give the preference.

The following is Mr. Stalkartt's memo. respecting the flax straw:—

Three specimens of flax straw:—

No. 1. *From Dutch seed,* stems measuring 4 feet in length, and perfectly free from branches. This seed was received from the Society, and sown in the first week in December, 1855, with the chemical manure (excepting bone dust) mentioned in the Secretary's "communication on the cultivation and manufacture of flax," published in the Society's Journal, Volume IX. p. 64.

No. 2. *From Riga seed,* stems straight and branchless, 3½ feet in length. This seed (also received from the Society) was sown about the 12th December, watered several times, and once with nitric acid, a very weak solution, 60 drops in water over 5 square feet; perhaps less would be sufficient.

No. 3. *From Saharunpore seed,* stems also straight and branchless, 3 feet in length. This seed (likewise received from the Society) was sown in rather dry ground, and watered once to make it germinate, and manured once with a very weak solution of sulphate of potash, about 60 grains in water to about five square feet.

The above specimens from Lieut. Ripley, Messrs. Bridgman and Stalkartt were referred for report to the Hemp and Flax Committee.

11. A sample of Russian Hemp. *Presented by J. B. Williams, Esq.*

The following articles, the produce of the Society's Garden, were also placed on the table:—

A. A quantity of vanille pods of last year's gathering.

B. Specimens of cotton from plants raised from acclimated Eddisto Island seed, presented by Mr. J. L. Nash in December, 1853, and from plants raised from Melbourne seed of Sea Island stock, and from imported Sea Island seed, presented by Mr. William Blundell in March, 1855.

C. A. small quantity (7 seers) of Tapioca powder.

D. Fruit of the vegetable marrow.

E. Specimens, in flower, of the so-called Chinese "Green Indigo," received from Mr. Fortune in 1854.

It was agreed that a portion of these vanille pods be sent to the confectioners for report. The cotton, (which was considered of a superior quality, especially that from the Eddisto Island seed,) was referred to the Committee.

In regard to the Chinese green dye plant, Dr. Thomson informed the meeting that an examination of the flower had confirmed his opinion of its belonging to the order *Rhamnaceæ.*

Horti-Floricultural Exhibition.

The following reports of the Judges regarding the second show of the season, held on the 1st March, were submitted :—

Horticultural.—The Judges have the pleasure to report that the second exhibition of vegetables and fruits for the current year was well supplied with both foreign and indigenous produce.

As regards Foreign Vegetables. Brussels sprouts, cauliflowers and Scotch kale : although the collections of these kinds were not large, still the samples of each sort were very good. The sulphur and white brocoli were shown in abundance of excellent quality, as also cabbages of six kinds. The broad-leaved and green curled endive were well blanched and well headed. Of spinach, the prickly seeded and green curled were produced in a green and tender state. Four kinds of lettuces were submitted in good order. Of celery there was a large display, the most of which had been raised from offsetts of a very inferior quality ; a few samples of celery raised from seed were also exhibited, and in a solid and good condition. The purple and white nole-kole were produced in abundance, and in different stages of maturity, of which some samples were of good quality. Four sorts of turnips were placed on the stands, all of good quality. Onions and chives were but scarce and poorly represented. Leeks were abundant. Of carrots, the short horn, Altringham, long red and orange were placed on the stands in abundance, and of excellent quality. The long red and turnip-rooted beet-root were well exhibited. Of mangold-wurzel the quantity was large, and the quality good. The turnip-rooted and long radishes were produced in small quantities, but of good quality. Of potatoes the usual kinds were brought forward in abundance and in different stages of maturity ; the whole were of good quality. The Windsor and long pod and French beans were on this occasion very abundant and the quality good : the Lima beans were scarce but the samples good. Peas were shown in numerous baskets, full, and of a tender and good description, among which were recognizable the imperial and Prussian blue, marrowfat and sugar. The flat squash was plentiful, and of good quality ; marrow was also shown of a fair description. Asparagus was neither plentiful nor good. The globe artichoke was abundant and of excellent quality. Parsnips were shown in good order ; also several baskets of nice sticks of horse-radish. Scorzonera was shown in small quantities, but of good quality. A collection of seven kinds of pot herbs was brought forward in a green and tender state. The water-cress was in abundance, young and tender, and likewise parsley. Some fine specimens of vegetable marrow from the Society's Garden were also placed on the stands, for exhibition merely, not for competition.

Of Native Vegetables, bringals, burbuttea, cucumbers, gingha and kurellas were shown in good condition. Tenasserim yams, pulwull, beans, Indian corn, ginger and chillies were abundantly represented.

Of Fruits, guavas, limes, lemons, pineapples, pomegranates, sapotas, bail, pummelows and papiahs were produced in abundance, and of fair quality. Oranges of country produce and plantains were likewise represented in good condition. Tomato, pumpkins and king cocoanuts were shown in abundance. Long and round plums, Cape gooseberries, mulberries and rose-apples were also abundantly exhibited and of good quality. A few baskets of ripe loquots and green mangoes were placed on the stands, though so early in the season ;—a few strawberries were likewise shewn.

A specimen of paddy and rice was submitted by Buddinath Doss, of Etal-Ghatta, which, the Committee suggest, should be referred to the Grain Committee for report, and, if favorable, the competitor to be rewarded at the next show.

The show was altogether a very satisfactory one : the competition was spirited. About 180 gardeners were in attendance, and prizes to the amount of Rs. 284 were awarded to 48, as per annexed list in detail. Four bronze medals were likewise given for the best specimens of potatoes, celery, turnip and Windsor bean.

(Signed,) WILLIAM G. ROSE.
„ PEARY CHAND MITTRA.
„ ST. DOUGLAS.
„ JOSEPH AGABEG.

Floricultural.—It is satisfactory to the Judges to be able to announce that this show was about one of the best of February—March, that has been held by the Society during the last 12 years, or since the establishment of floricultural exhibitions. The competition was spirited, the produce of about 34 gardens being submitted, and prizes, amounting to Rs. 159, awarded to twenty-four, according to the list in detail annexed herewith. Large collections of well-grown plants of verbenas, portulacus, oxalis, phloxes, heartsease, pinks and German asters were submitted ; also some excellent specimens of campanulas and antirrhinum ; and larkspurs of kinds not often seen in flower in our gardens. The bulbous and tuberous tribes were not numerous, but they comprised a few tolerably well-grown examples of gladiolus, cyclamen, columbine, hyacinths, crocuses, ranunculus, anemones, sparaxis, &c. Of *Centradenia floribunda,*—which only one specimen was shewn, for the first time, at the show held on 26th February of last year,—there were several fine plants from the gardens of Mr. E. Currie and others ; but, strange to add, not a single specimen of that deservedly favorite plant, *Cobœa scandens,* which was first introduced at the March show of 1855, and of which eight plants were submitted at the February show last year. The collection of orchids was limited, it being too early in the season; but a few good specimens, including *Cypripedium*, *Dendrobium*, and *Cœlogyne* were submitted from the gardens of Messrs. B. Warwick, D. B. Lindsay, F. Pereira, Captain C. B. Young and Dr. Macrae. A few well grown plants of *Francisea latifolia* were placed on the stands, those from the garden of Mr. James Church were very handsome examples, decidedly the best yet submitted. Among novelties the following may be enumerated. *Tropæolum pentaphyllum*, *Microloma* species, a species of *Capparis*, *Whitlavia grandiflora*, *Palafoxia* species, and *Cleome barbata*, from the gardens of Mr. S. P. Griffiths, Captain C. B. Young, Messrs. H. Wood, B. Warwick, W. H. Poe and R. F. Ross, respectively. Mr. Ross likewise submitted a fine plant of *Ixora (Javanica?)* and from the garden of Mr. W. H. Ilbery came some fair examples of *Potentilla*, which it has been found hitherto so difficult to flower.

The Society's garden contributed a collection of plants for exhibition only, consisting, among other specimens, of *Weigelia rosea*, *Azalea* species, *Henfreya scandens*, *Centradenia floribunda*, *Calceolaria* species, *Gesnera Douglasii*, a few orchids, a dozen *Begonias* of sorts, and 50 fine plants of *Euphorbia jacquiniflora*.

The Judges have again to express their thanks to Captain Robertson, Commissary of Ordnance, for the use of tents, and to Lieut. Fraser, Garrison Engineer, Messrs. Burn and Co., and Baboo Horrakristo Auddy, for the loan of stands on which to place the specimens.

(Signed,) A. GROTE.
" BENJ. WARWICK.
" S. P. GRIFFITHS.
" THOMAS THOMSON.

Read a note from Lieutenant-Colonel Sidney Powell, of H. M. 53rd Regiment, intimating that in consequence of some mistake about the conveyance for the men, the band of his Regiment was not at the above show, according to promise; and expressing his regret at the disappointment caused thereby to the visitors.

It was agreed that the third show of the season be held in the Town Hall, on Friday, the 4th of April.

Nursery Garden.

The Gardener's monthly report was read. Mr. McMurray states that the acclimated Chinese tea seed, the indigenous Assam tea seed, and the Ceylon coffee seed, recently presented from Messrs. Higgs, Carter and Thwaites have germinated freely. That the vanille plants are again showing a large number of flower spikes, from which a good supply of fruit may be expected next year. That the Chinese green dye plants are flowering freely. The Saharunpore flax is ripening a heavy crop of seed; the Dutch and Riga flax are not producing any thing like the same quantity, but the fibre will be of much greater length. The Gardener adds:—"The acclimated Sea Island cotton seed from Mr. Seabrooke's plantation, Eddisto Island, Charleston, S. Carolina, seems to produce as good a quality of cotton as the produce of the original stock, received in December, 1852, from Mr. Nash, as will be seen from the accompanying muster. The Melbourne Sea Island cotton seed received through W. Blundell, Esq., in March, 1855, from which plants were raised in the garden, is beginning to produce cotton freely, and of a good description, as will be seen from the muster, No. 2, now forwarded."

Mr. McMurray concludes his report with the following brief "Calendar of operations" in the flower garden:—

"Many of the varieties of *Achimenes*, *Gesneras* and *Gloxinias*, after their winter's rest, will have started into growth during the last month, or will do so in course of the present, by giving them at first a gentle supply of water, and as the plants advance in growth a more liberal quantity of water will be required to ensure a healthy growth; the whole of these plants thrive best in a rich light soil composed of leaf mould, peat, and sand in equal quantities, which should be well mixed together previous to using. *Gloxinia maculata* is propagated by dividing the roots, and the leaves of all the others, if taken off close to the stem and planted in a pot with a bell glass placed over them, will soon make young plants. The *Poinsettia pulcherrima* and *albida* should, at this season, be headed down to within two or three eyes of the last year's growth, these branches should be made into cuttings and planted out in a bed in a cool part of the garden, where they will root freely without the assistance of bell glasses. The *Euphorbia jacquiniflora* should also be cut over at this time, by cutting the whole of the branches of the previous year to within three or four eyes of the old wood, these branches should be made into cuttings and dibbled out into gumlahs, which can be placed in an open conservatory, without any bell glasses to protect them; indeed the bell glass only causes death to the cuttings in place of being of assistance in rooting them. *Tecoma grandiflora* should also be pruned back at this season, to ensure a free growth and abundance of flowers during the rains."

Recommendations from the Council.

The following recommendations from the Council were next read:—

First.—"The Council having taken into consideration the long and zealous services of Mr. A. H. Blechynden, the Secretary, his devotion to the interests of the Society, and the increasing duties attached to his office, beg to recommend that an addition of Co.'s Rs. 100 be made to his present monthly emolument in the shape of personal allowance to take effect from the 1st of January, 1856, and to submit that the present state of the funds will admit of the proposed increase to the disbursements, as will appear from the annexed report of the Finance Committee."

In reference to the above, Dr. Thomson submitted, and Mr. Stewart Douglas seconded, the following notice of motion :—

"That the recommendation of the Council, as to adding Co.'s Rs. 100 to Mr. Blechynden's monthly emolument, in the shape of personal allowance, from the commencement of the present year, be adopted at the next meeting."

Second. Premia for certain objects : "That the same Committee (Messrs. Haworth, Grote, Ramgopal Ghose and Peary Chand Mittra) with the addition of Dr. Thomson, be requested to consider and report to the Society, respecting the propriety of renewing the offer of premia which expired at the end of last year, and whether there are any other objects for which it would be desirable to offer premia."

Resolved.—That this recommendation be adopted.

Third. Patron of the Society vacant by the departure of the Marquis of Dalhousie : "That the same course be pursued on this, as on the last occasion of a vacancy in February, 1848 ; namely, that a deputation consisting of the President, Vice-Presidents and Secretary, do wait on the Right Hon'ble the Governor-General, with the view of requesting His Lordship's acceptance of the office of Patron of the Society."

Resolved.—That this recommendation be also adopted. The President undertook to ascertain on what day it would be agreeable to Lord Canning to receive the deputation.

Fourth. Circular from the London Society of Arts, offering to take into union Societies established in a British Colony or in the British possessions in India, for the advancement of Literature and Science, or for the encouragement of Arts, Manufactures and Commerce, and stating the conditions and terms of such union : "That this Society intimate to the Society of Arts their readiness to be taken into union, and their willingness to pay the annual subscription of two guineas."

Resolved.—That this recommendation be adopted.

Letters were submitted :—

1. From Secretary Board of Revenue, a communication from the Collector of Sylhet respecting the discovery of tea in that district. Ordered for publication in the Journal.

2. From Lieutenant-Colonel F. Jenkins, dated Gowhatti, 2nd March, expressing his gratification at the proceedings of the last meeting of the Society, in respect to "paper materials," and enclosing the following copy of a letter regarding Indian fibres, which he has received by the last mail from

the *Times* office; it is addressed to the Editor of that paper by Montagu Gore, Esq.:—

"The limited Liability Bill is one of the few important measures passed last session, and to no part of the empire will that measure, perhaps, be of such consequence as the East Indies. There we see vast native resources, still undeveloped from want of the application of European capital.

Of these resources few are entitled to more attention at the present moment than the fibrous plants with which India abounds, and of which so interesting an account has been recently published by Dr. Royle.

In Central India, hemp can be grown superior in strength to the best Russian hemp. Dr. Royle had equal weights and equal lengths of St. Petersburg clean hemp and Jubbulpore hemp taken, their ends tied and fixed in a vice, and then the number of pounds ascertained with which each broke. The result was, that the St. Petersburg hemp broke with 160 pounds, but it required 190 pounds to break that from Jubbulpore. The China grass and wild *Rhœa* from Assam, and the hemp from Kote Kangra, in the Himalayas, bore much greater weights still without breaking.

There is no point of view in which these Indian fibres are of more importance than in the materials which they offer for paper making. Cheap paper might be made from several of the grasses of India, but among cultivated plants none is so likely to yield large supplies for this purpose as the plantain. "The plantain," says Dr. Royle, "offers an excellent material for paper-making, which may be had in inexhaustible supplies, whenever those chiefly interested choose to take the necessary measures for securing such a supply."

An objection may be made as to the expense of the freight and carriage of the article from so great a distance. On this subject Mr. Henley observes in a paper published in the *Journal of the Society of Arts* for 1854: "I am of opinion that contracts could be made, according to the ordinary usages of the country, at the rate of from 1 rupee 8 annas, or 3s., to two rupees 8 annas or 5s., per maund of 82lb., deliverable at any central depôt within a radius of 20 miles. These prices are equal to from about 4*l.* 4s. to 7*l.* a ton; and that of these the lowest priced material could be landed in London, paying all charges, for 13*l.* 4s., and the more expensive, which would include articles equal to linen rags, at 16*l.* 5s." Among the other advantages which will result from improved internal communication, whether by roads, railways or river navigation, will be a material reduction of these prices.

"For the increased cultivation or preparation of these fibres European capital is, however, indispensable; and it would be necessary to make pecuniary advances to the natives. This might be done by respectable dulals, or native agents, or by the establishment of European agents near the places of production. The subject is one which well merits the attention, not only of the manufacturers and Chambers of Commerce of this country, but of all who take an interest in the future prospects of our majestic Indian empire, with its 150,000,000 of human beings, or who reflect on the extent of which its improvement may contribute to the prosperity of Great Britain herself."

3. From the Reverend J. Morgan, giving an account of the manner in which he has distributed the vegetable seeds furnished to him by the Society in various localities along the banks of the Roopnarain and its vicinity. Mr. Morgan states that these seeds were most eagerly sought for in every spot he visited during his recent tour, and the people were thankful for the smallest quantities.

4. From the same, reporting on the character of the *Indian Agricultural Miscellany.* Mr. Morgan states, what has been also remarked by several others to whom copies of the work in question have been furnished, that "the articles are written in a popular style, indeed just as the people speak." Mr. Morgan, however, suggests that a selection be made from the articles published, for the use of rural districts, where cultivation is, for the most part, limited to consumption, embracing such papers as that of the mode of growing sugar-cane, Indian corn, potatoes, beet and other exotic vegetables.

Resolved.—That this letter be transferred to the Translation Committee.

5. From the Secretary Royal Asiatic Society, returning thanks for the donation of certain numbers of the Journal of this Society.

For all the above communications and presentations, the best thanks of the Society were accorded.

(*Wednesday, the 9th April,* 1856.)

The Hon'ble Sir Arthur Buller, President, in the Chair.

The proceedings of the last general meeting having been read and confirmed, the Hon'ble the President informed the Members that, in pursuance of the Resolution passed at that meeting, a deputation, consisting of the Officers of the Society, had waited on the Right Honorable the Governor-General; that His Lordship had most readily consented to accept the office of Patron of the Society, and also intimated that Lady Canning would have much pleasure in becoming Patroness.

The President further stated that he had recently received a communications from Lord Canning, enclosing a subscription of Rs. 500, and stating that his subscription would, in future, be sent through the regular channel.

The gentlemen proposed at the last meeting were duly elected Members, viz:—

His Excellency General the Hon'ble George Anson; Messrs. G. C. Paul, Thomas Fraser; J. F. Galiffe; and A. MacCrea.

The names of the following gentlemen were submitted as candidates for election :—

H. G. Keene, Esq., Civil Service, Deyrah Dhoon,—proposed by the Secretary, seconded by Mr. W. G. Rose.

Rajah Suttoo Shurn Ghosall,—proposed by Baboo Peary Chand Mittra, seconded by Baboo Ramgopaul Ghose.

Wm. Shelford Fitzwilliam, Esq., Agent Commercial Bank of India,—proposed by Mr. C. A. Cantor, seconded by the Secretary.

E. Shearin, Esq., Merchant, Calcutta,—proposed by Mr. T. E. Carter, seconded by Mr. B. Warwick.

Captain F. Whiting, *Bengal Engineers*,—*proposed by the Secretary*, seconded by Mr. Cantor.

The Rev. Charles Parish, Chaplain of Moulmain,—proposed by Dr. Thomson, seconded by Mr. Rose.

Wm. Eames, Esq., Calcutta,—proposed by Mr. Cantor, seconded by Mr. Warwick.

Dr. F. J. Mouat, Inspector of Jails, Lower Provinces—proposed by Dr. Thomson, seconded by the Secretary.

The following contributions were announced :—

1. Selections from the Records of the Government of India, No. 10. *Presented by the Government.*

2. Reports of the Juries of the Madras Exhibition of 1855. *Presented by Dr. Cleghorn.*

3. A sample of Assam Rheea fibre rope, manufactured by Messrs. W. H. Harton and Co., for artillery traces. *Presented by the Board of Revenue.*

This rope was tested in the Arsenal of Fort William, and broke with a strain of 59 cwt. ; the last 9 cwt., being thrown upon the testing scale. A portion of this rope has been sent to Lieutenant-Colonel Abbott, who has forwarded it to the select Committee at Agra.

4. A sample of Rheea fibre, prepared by Mr. Nichol, at Dinagepore. *Presented by C. S. Leckie, Esq.*

The crop of last season, of which the above is a sample, was sold by Mr. Nichol to Government for about 40 rupees per maund.

5. A sample of "Jubbulpore hemp" (*Crotalaria tenuifolia*), produce of season 1855-56. *Presented by J. B. Williams, Esq., of Jubbulpore.*

6. Two samples of line made from Jubbulpore hemp. *Presented by Messrs. W. H. Harton and Co.*

No. 1. Is a four strand 1½ inch line, made from hemp raised last season in the Society's Garden, which broke at a strain of cwt. 12-3-3½. Mr. Stalkartt (of Messrs W. H Harton and Co.) is of opinion that the hemp from which this line has been made (and on which he was requested to report,) was considerably overretted. The excellency of the manufacture alone has enabled it to stand as much as cwt. 3-3-3¼ over the Government test for good rope. This result does not prove that the climate of Bengal is inimical to the culture of this fibre, but that the fault lies in the process of preparation.

No. 2. Is a 4 strand 1½ inch line, made from hemp raised at Jubbulpore, season 1854-55, which broke at a strain of cwt. 18-1-11, or more than double the Government test. Mr. Stalkartt is not aware of any Russian hemp having stood an equally severe test.

7. Two specimens of Flax raised at Goosree, near Calcutta, from Riga and Saharunpore seed, and prepared without water retting. *Presented by John Stalkartt, Esq.*

Mr. Stalkartt submits these two samples to shew that there is length and plenty of fibre in the plants for all practical purposes ; but the process by which he has been obliged to clean it has been so rude and rough,--simply beating it,—that the fibre has been somewhat damaged from the native workmen having beaten it two or three times in the same place, and, as a consequence, cutting it right through. Had it been prepared by rollers, this damage would not have occurred. Mr. Stalkartt thinks that when water retting is employed, 12 to 18 hours are quite sufficient for the purpose.

8. Samples of Flax straw raised in the Society's Garden from Riga and Dutch seed, each upwards of three feet in length and free from branches.

9. Two mats made at Kyook Phyoo from the *Shaw Ne.* *Presented by Lieutenant F. W. Ripley.*

The following is extract from Lieutenant Ripley's letter respecting these mats :—

No. 1. is, I think, the best of the two, and is made quicker and easier than.

No. 2. The work in this is fine, and much closer than the specimen of Russia mat you kindly sent me.

I shall be glad to hear the opinion formed of these mats. I cannot as yet give any idea as to what they would cost,—the men are new to the work, and it has taken 10 men to make No. 1, and 14, No. 2, but every day will improve this : they were made entirely by hand. The fault you mention in the sacking, (of which a specimen was submitted at the last meeting) I have already spoken about : if the thread or twine was twisted not so tight, a closer and better material will be turned out. It is for rice bags that it has been sold here, in the Province.

Referred to the Hemp and Flax Committee.

10. A case of plants of different sorts. *Presented by Lieut. Ripley.*

The particulars regarding these plants, are thus noted by Lieut. Ripley :—

" No. 1. Some plants of a perennial which grows to a large size called by the Mugs, *Maigrae* or large Indigo ; from its leaves and stems a blue dye is made, it is propagated by cuttings.

No. 2. Seven young plants of the *Musa Arakanensis*, called by the Burmese *Bakoney nat payar thee*, the plantain from which the fibre I sent up some time since was procured; if well manured, &c., the fruit of this tree is one of the best plantains there is.

No. 3. A few plants of the *Paupeng Shaw*.

No. 4. Seed of the same, of both kinds red and yellow.

This seed I recommend being sown in rather rich soil at the commencement of the rains, and closely scattered, to prevent the plants branching, and thus increase the length of the main shoots and fibre. The natives here cut the plant when the bark begins to turn brown, then split the stem with a knife, and the bark easily separates from the wood. It is then soaked in clear water for a day or two and exposed to dry in the sun, when with a little beating the fibre is separated from the useless portions of the bark."

11. Specimens of a root, baked and unbaked, from the Tributary Mehals of Cuttack. *Presented by A. Grote, Esq.*

The following is extract of a letter from E. A. Samuells, Esq., to Mr. Grote's address, respecting this root:—

"In a separate parcel I send you specimens of a root, baked and unbaked, which is known here by the name of *pauper*, pronounced exactly like the English word paper. It is found in Boad, one of the Tributary Mehals, but is by no means common, very few people here having heard of it. The Ungool Tehseldar fell in with it when employed in Boad last month, and sent me some specimens as a curiosity. The taste of the baked specimens, you will observe, is very much that of *Chubenee*, though rather more glutinous. I have sent twice for the plant, but it has not yet reached me, and as the *pauper* has not improved in appearance by keeping, I send it to you at once, that you may ascertain if it is known in Calcutta. It is said to be the root of a creeper which is sliced and dried. If it grows readily, it will form an important addition to the food of the people."

The Secretary mentioned he had shown the root to several persons, natives of Cuttack and others, but they had never previously seen it.

12. A small quantity of Mysore Coffee Seed. *Presented by A. J. Brown, Esq.*

Mr. Brown, writing from Madras, 1st April, remarks: "I was rather late to obtain cherry coffee, which some people prefer as seed, the whole of the crop having been despatched; but I have obtained and send to you by this steamer, some parchment coffee, that the monkeys and birds have picked and pulped. The berries are sure to be fine ones, fully ripe; and for transmission to a distance it is preferable to the cherry coffee. I shall be very glad to hear that it arrives safely and succeeds well."

13. Seed of "a species of castor oil plant," of which a specimen was submitted by him at the last meeting. *Presented by K. M. Nicholson, Esq.*

Dr. Thomson mentioned that the plants raised from this seed were found to be identical with the common castor oil plant.

14. A few tubers of the yam referred to in the proceedings of the last meeting. *Presented by Captain H. B. Weston.*

15. A quantity of seed of *Poinciana regia. Presented by Mr. A. D'Cruz, Junior, and by Mr. Sharpe of the Barrackpore Park.*

16. An assortment of seeds of Himalayan *Coniferæ*, of Rhododendron, &c., and a packet of Kumaon Tea seed. *Presented by Dr. Jameson, Superintending H. C. Botanic Gardens, North-Western Provinces.*

A few copies of the new Part of the Journal, (IX, 2), just received from the press, were laid on the table.

Horti-Floricultural Exhibitions.

The following reports of the Judges on the last show of the season were submitted :—

Horticultural.—In submitting the annexed list of prizes amounting to Rs. 185, which were awarded at the Exhibition held in the Town Hall, on the 4th April, 1856, the Judges beg to offer the following remarks :—

First—As regards exotic vegetables, it may be noted that the asparagus was pretty abundant, though early in the season, of a fair size, young and tender. The artichokes (red and white globe) were tolerably good. Of Lima and French beans there was a fair collection, especially of the latter. Windsor bean was also brought forward in small quantities, but of good quality. The turnip-rooted and long red beet-root were submitted, in good condition, and in abundance. Of cabbages the early York, Savoy, Battersea, drumhead, red and Brussels sprouts were well exhibited. The Altringham, short horn, long red and yellow carrots were exceedingly good. The red and white celery was inferior to that of last year. The broad leaved and curled endive were well blanched and tender. There was a good collection of six kinds of potherbs, as also of lettuces, viz., the Paris cos, cabbage, and black seeded cos, with large well blanched heads. The parsnips were better than, perhaps, at any previous show, the roots being large, long, well-shouldered, and of excellent quality. The competition for potatoes was, as usual, spirited : no improvement was shewn on the old varieties, but the quantity and quality were equally as good as on former occasions. The vegetable marrow and flat squash were well exhibited. Turnips and nole-kole, as was to be expected from the late period of the season, were not of good quality. The radishes, both round and long, were good. Several baskets of good onions and leeks were placed on the stands. Only one basket of peas was submitted, but they were good. There was a fair display of water-cress in a green and tender state.

Second.—Among country vegetables, the collection of beans was large, young and tender. The large red and yellow capiscums were brought forward in good order. The Indian corn was very plentifully exhibited on this occasion with large, young, and tender heads. The Tenasserim yam was of a fair quality. Of sugar-canes the specimens were very good.

Ginger and brinjals were well shewn, and the number of inferior kinds of indigenous vegetables were abundant.

Third.—In the fruit department, a few baskets of ripe peaches were produced, though early in the season. The collection of guavas was small but good. Oranges, Limes and loquats were produced in rather large quantities, but the quality of the latter was poor. Mulberries were scarce and of poor quality. Several baskets of young large mangoes were placed on the stands. There was a pretty fair collection of pine-apples. The pomegranates were few but good. Pummelows were abundant. Sapotas were very abundant and of good quality. Besides these, there were several baskets of bullock's heart, papyas of two kinds, champa and Dacca plantains, the Cape gooseberry, rose-apples, figs, melons, pumpkins, bail, and a few fruits of inferior description.

Though as expected, the display was much smaller than on the two previous shows of the season, there was a fair competition. About 60 gardeners were present, and 35 gained prizes.

(Signed,) WM. ROSE.
" PEARY CHAND MITTRA.
" JOSEPH AGABEG.

Floricultural.—The Judges have the pleasure to report that this show was not only much better than last year's, but a decided improvement on that of April, 1854, at which there was a very fair display.

The principal attraction on the present occasion was the Orchids, of which the collection was equal in quantity to any preceding season, and superior in variety. Eleven gardens contributed towards this department, including the produce of the H. C. Botanic Garden, and the Society's Garden, both which, however, were sent for exhibition only, not for competition. Among those from the Botanic Garden, were beautiful specimens of *Phalænopsis amabilis* from Java ; *Renanthera coccinea* from China ; *Cattleya Forbesii* from Brazil ; *Dendrobium densiflorum,* and *Œrides* species, a new red variety from Assam, and *Saccolabium* species, a new dwarf pink sort also from the same province. The Society's Garden shewed fine examples of *Dendrobium secundum* and *Saccolabium retusum.* From the Garden of Mr. Warwick came ten sorts including *Saccolabium miniatum,* and two new species of *Œrides* from Bootan and Suddya. In Mr. Grote's collection were two good plants of *Phalænopsis* and *Dendrobium formosum.* Among Mr. Pereira's plants was a fine example of *Renanthera coccinea* and a *Phalænopsis amabilis.* Mr. Ross contributed, among other plants, a specimen of *Camarotis purpurea.* Mr. Norris shewed a fine example of *Vanda teres,* and Baboo Sreekissen Sing an equally fine one of *Saccolabium guttatum.*

In the general collection there was a fine display of Asters, those from Mr. Currie's garden included several very well formed flowers. The Lily tribe shewed well, especially the Amaryllids from the gardens of Messrs. Ross and R. Wood. A few pretty Gloxinias were shewn from Mr. Griffith's Garden, and from the Botanic Garden; also from other gardens, several well grown plants of *Lemonia spectabilis* including a variety with light rose colored flowers; several specimens of *Gaura lindhemeria*, and a well-grown plant of *Cissus discolor.*

Among the novelties were plants of an *Arctotis* submitted by Mr. Griffiths; another new composite plant from Texas, with something of the character of *Rudbeckia*, from Mr. Warwick, and a third plant of the same family, from Mr. Poe's garden. Mr. Pereira forwarded a cut specimen of *Erythrina Blackei;* from the Botanic Garden came a Jamaica creeper, *Securidacea virgata,* and a new species of *Brunsfelsia* from the garden of Mr. H. Wood.

It may be added, in conclusion, that of about 20 contributors, 13 obtained prizes to the amount of Rs. 100, (as per annexed list in detail,) which were distributed by W. G. Rose, Esq. Vice-President.

(Signed,) THOMAS THOMSON.
" BENJ. WARWICK.
" A. GROTE.
" S. P. GRIFFITHS.
" E. W. WINGROVE.

Nursery Garden.

A Report was read from the Garden Committee, suggesting a communication to Dr. Thomson, on the subject of the transfer to the Society of a small piece of ground, at present belonging to the H. C. Botanic Garden, lying on the East of and adjoining the portion of ground occupied by the Society.

Resolved.—That the communication be made.

The Gardener's monthly report was read:—"I have the pleasure of forwarding"—writes Mr. McMurray— "a tabular statement showing the result of the pea crop cultivated in the garden, season 1855-56, from which it will be seen that the yield and quality of the peas are equal to any previous season. The Dutch and Riga flax seeds, although received and sown too late last year in the garden, have produced a fair length of plant without irrigating or any other artificial means, and that on very poor soil, as will be seen from the accompanying samples, which may be deemed sufficient to show what the produce might be in this country under a proper system of cultivation on sick, and mellow land.

"The American apple trees are again flowering in the garden, but as yet have set no fruit. I regret to state that the heavy fogs in March last have blighted the whole of the mango crop and damaged the avacado pears, peaches and litchee fruit more or less. The genuine West India ginger roots presented to the Society by G. H. W. Thwaites, Esq., in December last, have made a fine growth where they are planted out in the open ground.

The China plants received from Mr. R. Fortune in February last, are doing well, and the seeds of the new dwarf sweet chesnut have germinated freely. The Ward's case of plants just received in the garden, and presented to the Society by Captain Ripley, of Arracan, contains three kinds of plants all in very good health, among which I recognize the Chinese or Assam Room Dye plant."

Mr. McMurray closes his report with the following Calendar :—

"The vine plants should be looked over at least once a week to train and tie in the young wood for next year's crop, and to thin the bunches, in order that the berries may have room to swell fully ; and, to support the shoulders of such bunches, as may grow large and hang loosely, require to be suspended to the wall or branches, in order to prevent mildew at the time of ripening. A pair of narrow pointed scissors is the best for thinning the bunches, which should be reduced to the extent of from a fourth to a third part of the berries ; by this means the largest sized fruit will be obtained, which is always merited. The present dry weather is a good time for dressing and training up shrubberies and other borders, as the sun at this season will do more good in the way of killing weeds on walks and other places that may be hoed up, than a great number of men during the rains ; indeed I would advise that all grounds, whether in the flower or kitchen garden, be turned up at this time, as the advantages to be gained by so doing are many, and of the greatest importance to the cultivation and vigour of the crop during the ensuing season."

The motion, of which notice was given by Dr. Thomson at the last meeting, to the effect,—"that the recommendation of the Council as to adding Rs. 100 to Mr. Blechynden's monthly emolument, in the shape of personal allowance, from the commencement of the present year, be adopted at the next meeting,"—was introduced by the mover, seconded by Baboo Ramgopaul Ghose, (in the absence of Mr. Douglas,) and carried unanimously.

The following additional communications were read :—

1.—From R. Fortune, Esq., dated Saharunpore, 26th March, offering his best thanks for the honor conferred on him by his election as an Honorary Member of the Society. Mr. Fortune adds :—"I am also much pleased to observe that the thanks of the Society have been communicated to Government for its liberality in allowing me to devote a portion of my time, while in China, to the furtherance of the Society's objects."

2.—From Major F. C. Burnett, Lahore, dated 8th and 14th March, respecting silk and flax experiments in the Punjaub :—"Our silk-worms are now in full operation ; we have some 25 millions feeding, and they consume many maunds of leaves. I have about 37 men occupied with them, and will soon have to increase the number, our large plantations of *Morus multicaulis* are now most valuable, for they were ready three weeks before the common mulberry, and but for them we would have been without food for the worms; I have been also lucky in having the use of two long ranges of empty barracks, which are nearly filled; but I am satisfied that the experiment has shewn that growing silk at this place is a failure; it is too expensive.

"Our flax is also a failure this year, as we have had no rain since September, but I hope to continue the experiment on a much larger scale next season, for we are getting out a large quantity of seed from England. I am certain that the Punjaub will become a first-rate flax country.

"The Kangra tea is very fine this year. I got a sample of it to try, and though I have used the Hill tea for many years, I consider this better than any I have tasted."

3. From J. H. Bridgman, Esq., forwarding a dried specimen of the *Titlee*, of Goruckpore, from the seed of which a fine drying oil is obtained.

The Secretary mentioned that this plant, which is known in Rohilkund by the name of *Jychee*, was first brought to the notice of the Society in 1842 by Mr. Tonnochy, Deputy-Collector of Bolundshuhur, who presented the Society with a specimen of the oil, which was very favorably reported on by the London Brokers, (see *Journal*, vol. II. p. 52). The specimen received from Mr. Bridgman had been transferred to Dr. Thomson, who recognizes it as "*Euphorbia dracunculoides* of Lamark, described in Roxburgh's flora; a plant common in all parts of India in the cold season, in corn fields especially. It is a native of Mauritius also, and is very nearly allied to *E. exigua* of Europe."

4. From A. W. Begbie, Esq., applying for a quantity of foreign flax seed for trial at Rangoon, and promising to communicate the result.

The Secretary stated that this request had been complied with.

5. From Messrs. D. Wilson and Co., reporting on the Vanille pods, the produce of the Society's garden, which were placed on the table at the last meeting:—

"We have tried the Vanille repeatedly, and are happy to say that it is better than that you sent us on a former occasion, that is, it is stronger, and makes a very good ice, but we are obliged to use more of it than would be necessary in our imported Vanille, consequently, in some cases the color is affected. The pod requires to be better dried, before being put away for keeping. Some of those sent to us became mouldy and useless. We think that five of the imported pods are equal in strength to eight of those we have tried from you."

For all the above presentations and communications the best thanks of the Society were accorded.

(*Wednesday, the* 14*th May,* 1856.)

W. G. Rose, Esq., Vice-President, in the chair.

The proceedings of the last General Meeting were read and confirmed, and the gentlemen proposed on that occasion were duly elected Members, viz. :—

Messrs. H. G. Keene, Civil Service ; W. S. FitzWilliam ; E. Shearin ; W. Eames ; Rajah Suttoo Shurn Ghosall ; Captain F. Whiting ; the Rev. Charles Parish, and Dr. F. J. Mouat.

The names of the following gentlemen were submitted as candidates for election :—

W. R. Gilbert, Hickey, Esq., Civil Engineer, Colgong ;—proposed by Mr. E. Mackintosh, seconded by the Secretary.

Lieutenant J. F. Pogson, Simlah ;—proposed by the Secretary, seconded by Mr. W. G. Rose.

Baboo Denonauth Sen, Calcutta ;—proposed by Mr. Joseph Agabeg, seconded by Mr. Francisco Pereira.

T. Hastings, Esq., Civil Assistant-Surgeon, Burdwan ;—proposed by Mr. Rose, seconded by Mr. R. Morrell.

Dr. D. G. Clerk, Calcutta ;—proposed by Mr. Agabeg, seconded by the Secretary.

G. H. Freeling, Esq., Civil Service, Oorai, Bundlekund ;—proposed by Mr. B. Warwick, seconded by Mr. C. A. Cantor.

Newcome C. Tuckerman, Esq., (firm of Whitney and Co.,) Calcutta ;—proposed by Mr. Agabeg, seconded by Mr. Rose.

Dr. J. R. Barry, (firm of Scott, Thomson and Co.) Calcutta ;—proposed by Mr. T. E. Carter, seconded by the Secretary.

Captain E. H. Power, Deputy-Judge-Advocate-General, Nagpore ;—proposed by Sir Arthur Buller, seconded by Mr. Rose.

F. B. Kemp, Esq., Judge of Backergunge ;—proposed by Mr. R. Ince, seconded by Mr. H. A. R. Alexander.

John O'Brien Saunders, Esq., Merchant, Calcutta ;—proposed by Mr. Joseph Willis, seconded by Mr. Rose.

The following contributions were announced :—

1. Report on the Government Botanical and Horticultural Gardens, Ootacamund, for 1854-55. *Presented by Mr. W. G. McIvor.*

2. Specimen of Souchong tea, grown and manufactured at Kangra in the Punjaub in 1855, and sold at 3-10 per pound. *Presented by Major F. C. Burnett.*

3. Fibre of the Bon-Kupass, (*Hibiscus vitifolius.*) *Presented by C. E. Blechynden, Esq.*

The Secretary mentioned that some of the Members of the Hemp and Flax Committee, to whom he had shewn the above specimen, considered the article worthy of further attention, as it possesses fair strength, with good length and color. A ball of twine, made from the same fibre, and presented by Colonel Hannay during his recent visit to Calcutta, was also placed on the table.

4. A bag of seed of the Pala Indigo tree, (*Wrightea tinctoria.*) *Presented by G. F. Fischer, Esq., of Salem.*

5. A few seeds of *Amherstia nobilis. Presented by Mr. C. Sharpe, of the Barrackpore Park.*

6. A collection of Orchids from Assam. *Presented by Mr. C. J. Simons.*

7. A few Orchids from Jessore. *Presented by R. W. G. Frith, Esq.*

Submitted the following recommendations from the Council:—

1st. That the proposal of the Garden Committee be recommended for adoption, viz., that the necessary expenditure (Rs. 250 to Rs. 300) be incurred for the conveyance of a quantity of manure, about 250 tons, from the Commissariat bullock shed at Cooly bazar to the Society's Garden. Also an expenditure of about Rs. 50 for preparing kunkur for a top dressing (which is much required) for the garden walks.

2nd. That Woomachurn Komakur, who has been working as an apprentice in the Society's Office for the last 18 months, and whose services are useful, receive a pay of Rs. 5 per mensem.

3rd. That the wages of Munsoor Sheik, Packerman, be increased from Sa. Rs. 5 to Co.'s Rs. 6 per mensem, in consideration of his long and steady services of ten years.

Proposed by Baboo Gobind Chunder Sen, and *Resolved*, that the first of the above recommendations be now adopted in accordance with Section 6, of Chapter XII of the Bye Laws; and the other two lie over for adoption at the next Meeting, in accordance with Section 6 of Chapter XI.

Nursery Garden.

The Gardener's monthly report was read.

Mr. McMurray observes, in continuation of his report for March last, that the American apple trees have set a few fruit, which at present bear a healthy bloom, and the trees continue flowering. "The stage erected last March under the large almond tree, as an experiment to grow the vanilla plants on, has, up to the present time, answered the purpose well, and appears to be better adapted for the growth of the fruit, than the old method of growing the plants against the trunks of trees, on which, in the course of one season, a healthy plant grows too high to admit of the flowers being conveniently reached for fertilization. On both the stage and against the trees a fair crop of this fruit has been set, some pods of which at present measure more than seven inches in length.

The experiment which has been going on in the garden for the last five years, in cultivating the pine-apple plants in the most open and exposed situation in the garden, without irrigation, while fully exposed to the sun, has succeeded satisfactorily, and may now be brought to the notice of the pine-apple cultivator as being a better method of growing the plants than that usually practised in Bengal under the shade of trees where the free action of the air is obstructed, and seldom if ever a blink of the sun reaches the plant, which are the main elements that should be attended to for producing a rich colour, flavour, and sweetness, not only in this but in all other kinds of fruit. In drawing the attention of the fruit cultivator to this subject, I have every confidence of its success, from the favourable reports given on the fruit cultivated under this system. The pine-apple plants in the garden have again set a heavy crop of fruit and are throwing off a large number of suckers from both the stools and sides of the fruit, which will be ready for issue during the ensuing season."

The Gardener notices certain contributions from Mrs Dunbar, Captain Hamilton of the ship *Swithamley* and Mr. C. B. Stewart. The latter gentleman has presented 50 seeds of a cucurbitaceous plant, called "Loof Alishan Hummam, or vegetable fibre flesh brush, used in all well appointed Turkish and Egyptian Hummams:" it is from the fruit, which is of a spongy nature, that the brush is made; the seeds have germinated readily.

Mr. McMurray closes his report with the following calendar of operations for the present and beginning of the ensuing month: —

"Lose no time in forwarding the *gooteing* of Lichee trees before the midsummer growth commences; the young wood of last year's growth is the best for that purpose. The grafting of peach trees should be performed on the young wood of both the stock and scion of this spring's growth, which will unite in the course of six weeks, at this season of the year; avoid as much as possible the grafting of this tree on old stocks, as the junction is invariably bad. Inarch mangoes and pummelows on the young wood of last year's growth. Layer oranges, lemons, limes, Brazillian cherry and other fruit trees, so that the collision may take place before the rains set in, at which time the young roots will soon make their appearance. Graft sapotas from approved sorts, and sow peach seeds, water, and attend to young fruit trees as the late rain may have started them into growth, and the present dry weather is sure to give that growth a check which, if not properly looked after, may kill the trees. Stake up pine-apple fruit; plant out tapioca and arrowroot for general crop, if not done during the last month. West Indian ginger and useful indigenous roots may be planted out at this time on newly prepared ground. Sow lettuce seed in gumlahs, and after germination prick out into small pots in which they will form nice heads, by being placed in the north side of the conservatory, and can be blanched when fully grown, by placing a pot over them to keep off the light. Mustard and cress should be sown every other day in gumlahs, and placed in a cool corner, which will give an ample supply daily; young onions may be raised in the same way, the whole of which will form part of a nice salad during the rainy season. Scatter the mustard and cress seed rather thick and cover in with the earth. In the flower garden make the necessary preparations for sowing balsam, zinnea, and other rainy season annuals, also attend to tuberous roots by renewing the soil, &c., propagate freely both by layers and cuttings; keep the grass plots short and the borders and walks in a clean and tidy state, stir the soil round pot plants, and attend to the watering; renew and make trellises for training such plants as the Maurandyas and other dwarf creepers."

Oil from Tamarind and Sunflower seeds.

Read the minutes by a section of the Committee on oil and oil seeds, regarding specimens of tamarind and sun-flower oil and cake, which were submitted at a former Meeting, from Captain Thomas Davis, of Booldana, and Mr. Michael Betts, of Berhampore.

Ordered—that copies of the above reports be sent to Captain Davis and Mr. Betts; and that Captain Davis be requested to send a larger sample (with estimate of the cost) to the Society, for transmission to the Society of Arts.

Cotton, the growth of the Society's Garden.

Submitted a long report from a section of the Cotton Committee (Messrs. Willis, Cowell, Douglas, and Blundell,) on sundry samples of cotton, the produce of the Society's Garden, from Australian, Sea Island and Eddisto Island seed, which was ordered to be transferred to the Committee of Papers for publication in the Journal.

Read a letter from Mr. W. G. McIvor, Superintendent of the Government Botanical and Horticultural Gardens, Ootacamund, dated 22nd April, intimating his intention of sending, abont the end of May, sample packets of vegetable and flower seeds, the produce of the gardens, as requested by the Society, for trial on this side of India. Mr. McIvor also forwards a copy of his report on the Teak forests of Malabar, which was transferred to the Committee of Papers.

Read the following extracts of a letter from Lieutenant J. F. Pogson, residing at Dounton, near Simlah, dated 28th March, 1856:—

"I wish to obtain a few of the seeds of the yam, grown by Captain H. B. Weston, and noticed at your monthly meeting held on the 12th of March. In addition I should also like to obtain half a pint each of the Windsor and long pod beans, and an ounce or two of the Lima bean. I am very anxious to introduce the yam into the Southern part of the Busahir territories, as I am convinced it will thrive in the valley of the Sutledge, because mangoes, plantains, the bair and jaumoon, as well as the burgut and peepul, all grow there. I have already introduced the scarlet runner bean into the higher pergunnahs of Bussahir, *i. e.* from five to nine thousand feet in height above the level of the sea, this will be a great stand by in case of famine, an event by no means uncommon up North. This bean is considered an annual, and it will perhaps surprise you to hear that I have some hundreds in my garden, three years old; they were sown in 1854, and I gathered my first crop, they sprouted again in 1855, and I had my second crop; they are now (1856) in flower, and in July and August, I shall have my third crop; the advantages to be derived from this singular change in the nature of this bean are obvious, especially in a country remarkable for its scarcity of food. It may not be generally known, that good cotton is grown in the Bhujjee valley some eight miles distant from Simla in the direction of the Sutledge; if you like I will send you some of the seed, and sample of hill grown cotton, when this year's crop is gathered. I have another singularity to communicate in the vegetable line; last year (1855) some barley accidentally sown sprung up in my garden. In November last, I gathered the ears, and ordered my mallee not to root up the stubble, which has sprouted, and there are on it at present 75 ears of barley fully formed, and likely to come to perfection by the end of June. This is not a solitary instance, as I have three others in the same state."

In a subsequent letter, dated 12th April, Lieutenant Pogson offers a few more remarks on horticultural subjects:—

"I am very thankful for the tubers of the yam, of which I intend taking the most especial care, as I consider it a most valuable edible root. I have not much hopes of the seeds. March is my last month for sowing beans, but still I will sow what you have so kindly sent to obtain seed for next year, and shall take the precaution of adopting the Marquis of Tweeddale's admirable plan, of sowing (seeds) over pipes, through which hot air can be driven, as this will enable me to make the seeds come to maturity, in case we have an early winter.

"You are most welcome to communicate the facts connected with the scarlet runner bean, and the barley to the Society, and in addition you may add, that lucerne sown up here (Dounton) flowers, and grows year after year, but will not bear seed, the consequence is that seed sown by me in 1852-53 now supplies me with plants which I propagate, year by year, by dividing the roots of the plants before the (puckka bursaut) rains commence. This again is another most convenient, natural *bundoobust*, and I hope yet to make the paharrees take advantage of it, instead of following their old and stupid plan, of burning the grass every year, and doing immense harm to the seedlings, and forests, with which the fire is sure to communicate.

"I will with great pleasure send you some Bhujjee cotton and seed, and I think your Cotton Committee would do much good, if some of the superior cotton seeds were sent up here and grown in the valley. I think the seed thus acclimatised, would answer better in the plains, than any other: at any rate the experiment is worth trying.

"Tobacco is extensively cultivated here, but the quality is inferior, and never commands the same price as the article from the plains. I think, however, that if good seed was sent me, I have sufficient influence with the Zemindars to effect its cultivation, and I am certain that it would have a beneficial effect on the Thibetan shawl wool trade, for a Thibetan loves a smoke of good tobacco, and would always bring down a few extra loads of Pushum, to barter for it."

For all the above presentations and communications the best thanks of the Society were accorded.

(*Wednesday, the* 11*th June,* 1856.)

W. G. Rose, Esq., Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed.

The gentlemen proposed at the last meeting were elected Members, viz:—

Messrs. W. R. Gilbert Hickey; T. Hastings; D. G. Clerk; G. H. Freeling, Civil Service; N. C. Tuckerman; J. R. Barry; F. B. Kemp; J. O'B. Saunders; Baboo Denonauth Sen; Lieut. J. F. Pogson; and Capt. E. H. Power.

The names of the following gentlemen were submitted as candidates for election;

Capt. G. W. Boileau, commanding 2nd Oude Irregular Regt. of Infantry;—proposed by Dr. J. Fayrer, seconded by Capt. F. F. Hayes.

A. O. Hume, Esq., Civil Service, Secretary Horticultural Garden, Etawah;—proposed by the Secretary, seconded by Mr. W. G. Rose.

George Thompson, Esq., Calcutta;—proposed by Baboo Peary Chand Mittra, seconded by Baboo Ram Gopal Ghose.

Capt. C. H. Dickens, Supt. of Irrigation, Behar;—proposed by Mr. Rose, seconded by Mr. R. Morrell.

R. E. Ronald, Esq, Deoghur, Beerbhoom;—proposed by Mr. Rose, seconded by Mr. Morrell.

Major-General Sir H. M. Wheeler, K. C. B;—proposed by Major Thomas Martin, seconded by Mr. Cantor.

Capt. Archibald Impey, Bengal Engineers;—proposed by Mr. S. P. Griffiths, seconded by Mr. R. F. Ross.

Dr. W. J. Palmer, Civil-Surgeon, Nuddea;—proposed by Mr. Thomas Savi, seconded by Capt. J. Eliot.

The following contributions were announced:—

1. Selections from the Records of the Government of India, No. XI. *Presented by the Government of India.*

2. Journal of the Indian Archipelago, May to September, 1855. *Presented by the Government of India.*

3. Journal of the Asiatic Society of Bengal, No. 1. of 1856. *Presented by the Society.*

4. Remarks on the culture of silk at Candahar. *Presented by the Author, Capt. Thomas Hutton.*

5. Four skeins of Assam mulberry silk, the manufacture and produce of Jorhat, one plain and three dyed. *Presented by Lieut.-Col. Hannay, on behalf of Capt. C. Holroyd.*

It was agreed that an application be made to Capt. Holroyd, for full particulars respecting this silk; the mode of culture and manufacture, cost, quantity raised, &c., as also the process of dyeing.

6. Cocoons and silk of *Bombyx Huttoni,* which feeds at Mussooree on the wild mulberry. *Presented by Capt. Thomas Hutton* (Referred to the Silk Committee for report.)

7. Sample of cotton, raised from Sea Island seed, in the garden of Mr. J. Sawyers, within the Fort of Monghyr, Forwarded by Mr. A. A. Swinton, Secretary to the Monghyr Public Garden.

Mr. Swinton mentions he has been informed by Mr. Sawyers, "that the shrub from which this cotton was gathered was planted about four or five years ago, that notwithstanding no care has been bestowed on its culture or growth, its branches have attained to a height of some 7 or 8 feet;—of these branches there are some 5 or 6 of about equal length, which bear twice a year, yielding about four seers of cotton at each picking."

The Secretary stated that the cotton had been pronounced by a Member of the Committee, to be of good color and strength, but short fibre, shewing it to have degenerated from the original stock, having, in fact, been changed from a black seeded long staple cotton, to a green seeded short staple cotton; this may have been caused partly from want of care in cultivation, and from the plant having been allowed to become a perennial.

8. Samples of flax fibre and a quantity of flax straw, raised at Allyghur from foreign seed. *Presented by Mr. C. Gubbins.*

(Further particulars respecting this flax will be found in the body of the proceedings.)

9. A quantity of mignonette and sweet pea-seed, the produce of his garden at Cutwa. *Presented by Mr. Geo. Hewett.*

10. A small asortment of acclimated flower seeds from Erinpoorah. *Presented by Major J. Hall.*

Nursery Garden.

The Gardener's monthly report was read. Mr. McMurray, notifies that the gale of the 14th May was severely felt in the garden. "In addition to the uprooting of trees and shrubs, breaking off boughs and knocking down bowers &c., the violence of the storm threw down the *pucka* Conservatory, under which the best descriptions of pot plants were grown; a great number of valuable plants have been partly destroyed and much disfigured, still a stock of nearly all the varieties have been saved. In the fruit department the number of trees damaged are few, but one rare kind has been destroyed. namely, one of the China trees received from Mr. Fortune, "Myrica species," of which there were three plants in the garden. The old plant of *Victoria Regia* has also died in the tank at the north end of the Rosery; and as the tanks are filling very fast from the late heavy rains, it is a question whether the small plants in *gumlahs* will be sufficiently large in time to get them planted out before the water in the tanks is so deep as to preclude all hope of placing them out.

"As the season for planting out fruit trees has set in, I may here state for the information of the Members, that eight hundred (800) mango grafts, three hundred (300) peach grafts (eighteen of each sort,) sapotas, pummelows, long plum, loquot, avacado pears, oranges, limes, lemons, grape vines, and a number of other varieties of fruit trees are ready for issue.

"The cropping of the garden is almost completed with the rainy season crops, of which a great part of the ground is sown with eight kinds of fibrous yielding plants. The Chinese yams of two kinds are doing well.

"The plantation of four kinds of cotton plants are making a healthy growth, and flowering freely, from which the seed is being carefully gathered for distribution to members. The Chinese green dye plant, although hard to strike by cuttings, increases from layers, of which from eight hundred to one thousand will be ready for issuing during the latter end of July. Members desirous of obtaining a stock of this plant are requested to make application before that time, as a guide of the number of plants I may be able to give to each Member; in my next report a short description of the general treatment of this plant, since it came into the garden, will be offered as a guide to its successful cultivation, which Mr. Fortune said on his late visit to the garden was equal to the best he had met with in China." Mr. McMurray closes his Report with the following calendar of operations for the present and beginning of the ensuing month :—

"The pots in which the *Lilium longifolium* are in should now be stored away in a dry part of the conservatory or verandah, and all watering stopped until the end of the rains; by that time the bulbs will start into growth of their own accord, when water should again be given freely to encourage a healthy growth. No time should be delayed in having the *Gloxinia maculata* shifted into the flowering pots, it is at this time that the plant requires good cultivation to ensure the flowering during the month of November, which is seldom met with about Calcutta. Balsam and *Zinnia* seedlings will have made a good growth when sown in May, and will now be fit for thinning out and forming clumps here and there, round the different borders and flower-beds. The *Martynias* are all pretty annual plants, and produce the finest flowers during this season, each kind of this family deserves a place in the flower garden, the whole of them being easy to cultivate. All the Salvias flower freely during the rains, but particularly *Salvia splendens* makes a pretty show when planted out in clumps in the pleasure ground. The several kinds of *Cupheas* stand the rains well and should be planted out of the pots at this season. Dahlias will be pushing out buds at this time ; a good compost should be prepared for the tubers and the bulbs planted out where they are intended to flower. Be sparing with water to tender conservatory plants such as *Begonias, Gesneras,* Bulbous rooted *Gloxinias,* &c., &c. Continue propagating from layers and cuttings and trim in and keep the shoots of shrubs in a compact and neat state. Graft mangoes, peaches and other fruit trees, plant out shrubs, fruits and other dwarf plants. Open and clear drains : see that established plants in pots are well drained ; should the vent for the escape of the water be closed up by worms, lay the pots on their side, and have a free opening made with the point of a stick, to insure this essential escape of water to take place ; then place the pots on two bricks, leaving a vacancy between each for the hole at the bottom of the pot to drain off the water freely ; remove part of the top soil from such plants, and fill up again with a good light compost. Continue to keep the scythes going, as at this time the grass makes a rapid growth, and decaying matter will cause an unhealthiness about the grounds that may be avoided by keeping the ground clear of leaves and other vegetable matter. Weed and renew walks where water may be seen to lodge, and keep the whole in a neat and tidy state, as nothing tends more to health and beauty at this season of the year.'

Report on Flax raised at Allyghur from foreign seed.

A communication from C. Gubbins, Esq., dated Allyghur, 4th April, respecting the specimens of flax previously referred to, was next read, together with reports on them from a section of the Hemp and Flax Committee :—

The Secretary having reported the arrival of the 220lbs. of flax straw alluded to at the close of Mr. Gubbin's letter, it was resolved to forward the greater portion of it to the Chamber of Commerce at Dundee, reserving a small quantity which, at the suggestion of Mr. Carter, it was agreed to transfer for report to Mr. Barry, a gentleman who has recently arrived here from Dundee, and is acquainted with the mode of preparing and manufacturing the fibre.

With reference to Mr. Stalkartt's suggestion that specimens of flax straw from all districts be collected and sent to England for chemical analysis, the Secretary drew the attention of the meeting to a statement in Royle's work on the culture of cotton in India, to the effect that Dr. Mayer, of the Madras Medical Service, had made an admirable analysis of the constituents of the flax plant, and of the soils in which it was grown : whereupon it was resolved that an application be made, in the first instance, to Dr. Mayer on the subject. It was further resolved that the other suggestions contained in Mr. Stalkartt's minute be referred to the Council for report.

Wild Silk worms of the Himalaya.

Read a letter from the Under-Secretary Government of India, forwarding, for the information of the Society, and for any suggestions they may feel disposed to offer, copies of a correspondence between the Government N. W. P. and Capt. Hutton regarding the hill silk worms. Captain Hutton solicits the assistance of Government, to enable him to prosecute enquiries, with the view of ascertaining the resources of the Alpine regions of India in this particular branch of its natural products.

Resolved, on the recommendation of the Council, that these papers be referred for report to a Special Committee, composed of the following gentlemen:—Dr. Huffnagle, Mr. W. G. Rose, Mr. J. Willis, Mr. A. Grote, Dr. Thomson, and Baboo Peary Chand Mittra, with power to add to their number.

Communications on various subjects.

The following letters were also submitted:—

1. From E. T. Trevor, Esq., Secretary Board of Revenue, enclosing copy of a letter from the Magistrate of Sylhet, reporting the successful result of his search for the tea plant in the district of Jynteah, and sending samples of the leaves.

The Secretary mentioned he had referred the leaves in question to Dr. Thomson, who had recognized them as belonging to an *Eurya,* and not tea at all.

2. From C. K. Hudson, Esq., Cherra, dated 19th May, reporting the result of his trials with the California potato, American maize, and seeds of field crops received from Messrs. Lawson of Edinburgh:—

"I have to apologize for not having replied to your letter of the 15th January last, informing me of the despatch of a box of vegetable and other seeds by the mess boat, which came to hand safely about the end of February, when I was just starting on a Mofussil tour. It was rather late in the season when I received them, but I distributed a large portion amongst the Cossyahs, and have kept the remainder in a dry place near the fire, and hope they will vegetate when the dry weather sets in again. It was fortunate that I did not distribute them all, for although they came up very readily, the heavy rain we have had since the beginning of April killed all the young plants before they began to flower.

"The Maize has answered very well, and is in great request with the Cossyahs, and if you can kindly send me a good supply of the acclimated seed from your garden next October or November, I shall be very thankful for it.

"The China and Dessee almond seed all failed, I am sorry to say, and the tuber of the Chinese potatoes has not sprouted yet, but the West Indian ginger roots are coming on well.

"I distributed 95 seers of California potatoes and 30 seers of Madras potatoes this year, and hope to obtain a good return from them in July next. I give them out to the people in various parts of these Hills, on condition that I am to have half the produce, and by this means I increase my own stock and gradually spread the seed all over the country. I had a very few California potatoes last January sent me from the garden of a gentleman here; some of them weighed half a pound each, and the eyes were very far apart, which is a sign, I believe, that they are likely to improve still more. I will send you a specimen from the next batch if they turn out well."

3. From Col. Jenkins, respecting straw paper.—" I quote the last notice" —writes Col. Jenkins—" I have seen of straw paper, whilst it is before me, as I know it will be interesting to you. I had some of the first made sent to me, and I found it capital paper for steel pens. I dare say it is now much improved. I do not observe that any has reached the Calcutta shops yet."

The following is the extract in question, taken from the *Clerical Journal*:— " Messrs. Parkins and Gotto's efforts to improve their straw paper has been very successful. We have seen no paper so serviceable as this (on account of its smooth surface) for a rapid writer. Another great desideratum is its cheapness. We recommend it to the attention of the clergy."

4. From Thos. Hill, Esq., reporting the result of his sowings of the Cape Water Rush seed in the Soonderbunds: " If the Society have any fresh seed of this description, I shall, with much pleasure, make further trials, as the Rush will, if it succeeds, be a valuable boon to the poor cultivators of the Soonderbunds."

The Secretary mentioned that Mr. Hill's name had been registered for a portion of another supply of seeds, as also for plants, now shortly expected from the Cape.

5. From Lieut. W. S. Row, to the same effect. Lieut. Row tried the seed at Balasore, a locality which, he was in hopes, would have been favorable to it; it was sown on the sea side, and on the high land in the station, but it was a failure, not a single seed having germinated.

6. From Messrs. Grindlay and Co., advising despatch of the additional quantity of galvanized wire fence ordered for the use of the garden, and which has recently been received.

7. From Messrs. D. Landreth and Son, Philadelphia, dated 9th April, advising despatch per ships *Isaiah Crowell* and *Herbert*, which left Boston at the end of March, of the Society's consignments of vegetable, maize and cotton seeds.

8. From Messrs. Peter Lawson and Son, Edinburgh, 18th April, on the subject of vegetable and flax seeds, to the following effect:—" We very much regret to learn of the failure of the garden seeds we sent last spring; every possible care was bestowed in selecting those of best new good growing seeds, and having them packed in dry good condition, and we assure you we are ourselves much disappointed at the results. We have given consideration to the report and suggestions of your Society's Committee, and for which we are much

obliged, and will be happy to send out two small assortments of garden seeds without charge. To give every chance of success this time, we will attend carefully to the condition of the seeds, packing, &c., and will have all packed in strong tin-lined boxes; we proceed at once to the execution of this and also of your obliging order for linseed, and hope to ship these by the *City of Delhi* from Glasgow for Calcutta to sail early in May. A small collection of garden seeds we will also forward by Overland route so as to reach Calcutta in August.

We regret we were unable to get the potato seed secured and into good dry condition in time to send you for the past season, but we will take an opportunity of enclosing a few pounds along with the seeds we are now sending you.'

The motion of which notice was given at the last meeting for a monthly increase to the office establishment of Rs. 5-11, was brought forward and agreed to; also a recommendation from the Council for the expenditure of the sum of Rs. 180 for iron arbors, frames, stands, &c., for the garden.

(*Wednesday, the 9th of July*, 1856.)

The Hon'ble Sir Arthur Buller, President, in the chair.

The proceedings of the last general meeting were read and confirmed, and the gentlemen proposed on the occasion were elected Members, viz.:—

Messrs. A. O. Hume; George Thompson; R. E. Ronald; Captain G. W Boileau; Captain C. H. Dickens; Major-General Sir H. M. Wheeler, K. C. B.; Captain Archibald Impey; and Dr. W. J. Palmer.

The names of the following gentlemen were submitted as candidates for election;

Captain W. H. Lowther, 1st Assam Light Infantry;—proposed by the Secretary, seconded by Mr. Joseph Agabeg.

Colonel A. M. Becher, Quarter Master General of the Army;—proposed by Sir Arthur Buller, seconded by Mr. W. G. Rose.

A. E. Cockerell, Esq., Civil Service, Moradabad; - proposed by Dr. W. S. Stiven, seconded by the Secretary.

Major F. Knyvett, 64th N. I. Department Public Works, Shergotty;—proposed by Major Thos. Martin, seconded by Major Champneys.

Dr. H. H. Bowling, Shajehanpore;—proposed by the Secretary, seconded by Mr. W. G. Rose.

J. C. Murray, Esq., Serampore;—proposed by Mr. James Church, Junior, seconded by the Secretary.

R. J. Wigram, Esq., Civil Service, Beerbhoom;—proposed by Lieutenant Colonel R. Houghton, seconded by Sir A. Buller.

Lieutenant Henri Campbell, 63rd N. I. Beerbhoom;—proposed by Colonel Houghton, seconded by Sir A. Buller.

James Young, Esq., Civil Service, Burdwan;—proposed by Mr. H. Alexander, seconded by the Secretary.

C. B. Wood, Esq., Merchant, Calcutta;—proposed by Mr. W. G. Rose, seconded by Mr. Stewart Douglas.

Mr. John H. Aubrey, Calcutta;—proposed by Mr. T. E. Carter, seconded by the Secretary.

James Egerton, Esq., Kajal Factory, Purneah;—proposed by Mr. S. P. Griffiths, seconded by Mr. C. E. Creswell.

Thomas H. Barry, Esq., Merchant, Calcutta;—proposed by Mr B. Warwick, seconded by Dr. J. B. Barry.

Robert Alexander, Esq., Civil Service, Commissioner of Rohilkhund;—proposed by Captain H. J. Guise, seconded by the Secretary.

A. N. Clark, Esq., Calcutta;—proposed by Mr. C. J. Sutherland, seconded by Mr. W. G. Rose.

The following contributions were announced:—

1. Narrative of the United States Exploring Expedition, vols. 1 to 5, with an Atlas. *Presented by Messrs D. Landreth and Son.*

2. Selections from the Records Government of India, No. 12. *Presented by Government.*

3. Half-yearly Report Bengal Chamber of Commerce. *Presented by the Chamber.*

4. Journal of the Asiatic Society of Bengal. No 2, of 1856. *Presented by the Society.*

5. Catalogue Raisonné of the Madras Exhibition of 1855, (one copy) official and descriptive catalogue of the same Exhibition (one copy), and Dr. Wight's observations on the Forest Trees of India. *Presented by Dr. Hugh Cleghorn.*

6. Report of the Royal Botanic Garden at Peradenia, Ceylon, from September 1854 to August, 1855. By G. H. Thwaites, Esq., Superintendent. *Presented by the Author.*

7. Specimen of Bohea Tea, grown and manufactured at Kangra in the Punjaub, and which is sold at four annas per pound. *Presented by Major Burnett.*

8. Sundry Vegetable Products used by the Kookies, as dyes, medicines and poisons. *Presented by Lieutenant R. Stewart, Commandant of the Kooky Levy, Cachar.*

The following is extract of Lieutenant Stewart's letter respecting the above products:—

"I have the pleasure of sending you by dâk banghy of to-day the following articles, which, I hope, may prove of some interest to the Society.

"1st. The bark and leaf of the two different trees from which the Kookies decoct their red dye.

"2nd. A specimen of the dye on goat's hair. To produce the color the bark and leaf are merely soaked in tepid water.

"3rd. A small quantity of the vegetable poison used by the Kookies in smearing their weapons of war and of the chase. The effects of this poison are most speedy and deadly. It is prepared by being pounded into a pulp with tobacco juice and capsicum seeds.

"4th. The bark of a tree used extensively among the tribes of this frontier as a cure for fever and bowel complaints. It possesses a bitterness equal almost to the Peruvian bark. The tree is not common in the country, and those I have met with have been stripped of their bark from the roots to the branches."

In reply to an enquiry from a member, the Secretary mentioned he had requested Lieutenant Stewart to oblige the Society with specimens of the plants yielding the above-mentioned products.

A. very well grown specimen of *Phaius (maculatus ?)* from the garden of Mr. B. Warwick, was also placed on the table.

Premia for articles of raw produce and for Essays.

Read the following Report of the Special Committee, appointed at the March meeting, to arrange the details for the offer of premia for certain objects :—

In accordance with the resolution noted in the margin, your Committee, having carefully considered the subject referred to them for report, now beg to annex a list of premia for certain objects, and for essays on certain subjects; as also a list of rules of competition for the Prize Essays.

In addition to the objects detailed in this list, your Committee took several others into consideration on which they beg to offer the following remarks :—

1*st*. *Fibre of Sida rhomboidea.*—Referring to the recent correspondence with the Chamber of Commerce at Dundee respecting this fibre, and to the fact of its cultivation being so very limited, the Committee would recommend that the experiment made last year at the Society's Garden be repeated this season on an extended scale, and that the prize which was included in the rough draft be kept in abeyance, pending the result of such experiment.

2*nd*. *Munjeet.*—That a prize for the communication of a good and economic mode of preparing this article for shipment, with the view of preserving the quality of the dye—be also kept in abeyance pending the result of a reference, which the Committee suggest should be made to the London Society of Arts respecting the Indian Garancine which Mr. Henley submitted to this Society in 1853.

3*rd*. *Quinine-yielding plants.*—The Committee being under the impression that any sum the Society could offer for the introduction of these valuable plants, would be inadequate,—beg to recommend that another communication on the subject be made to the Government of India, in continuation of that preferred in 1852, and that the gold medal be added to any reward the Government may be disposed to offer to the introducer of a given number, not less than 20, of South American Cinchonas of the kind or kinds known to yield the best description of bark.

4th. Substitute for Quinine.—Your Committee also took this subject into consideration, but as it is exciting a considerable degree of attention at the present time, they have not deemed it necessary to include it in the list of premia.

5th. New Granada Paddy.—A suggestion was made by a Member of your Committee to offer a reward for the production of a certain quantity of this description of Paddy, which yields more than two crops in one year, and for information as to the soil best adapted for its cultivation, cost, &c.; but after due consideration it was deemed desirable not to include it in the present list, but merely to record the fact of the question having been brought forward, with a view to its re-discussion at a future period.

6th. Drying-process Sugar (See Communication from Mr. Henley—Journal Vol. VIII).—This subject was also introduced, but it being the general opinion that there is not, at present, sufficient data, to entertain it, it was agreed that enquiries be made for further information, on receipt of which a supplementary report can be submitted.

Your Committee beg to recommend that these prizes be open to Competition to the 31st December, 1857, and further, that copies of the lists annexed be sent to the Secretaries of the Agricultural and Horticultural Societies of Madras, Bombay and the Punjaub, and that they be requested to make them as widely known as practicable in their respective Presidencies.

(Signed,) A. GROTE.
" THOMAS THOMSON.
" RAMGOPAUL GHOSE.
" PEARY CHAND MITTRA.
" WM. HAWORTH.

CALCUTTA:
June, 1856.

LIST OF PREMIA FOR 1856-57.

Premia for certain Articles of raw produce, &c.

Fibres (Substitute for Flax.)

For the production of any new vegetable fibre which can be successfully applied to all the purposes for which *flax* is now used, and of which not less than ten maunds to become the property of the Society. Rs. 1,000 and gold medal.

Fibres, (Substitute for Hemp.)

For the production of a quantity of any vegetable fibre, which can be successfully applied to the purposes for which *hemp* is now used and equally strong and durable, and of which not less than ten maunds to become the property of the Society. Rs. 500 and gold medal.

Fibres, (Rheea.)

For the production of at least 25 mds. of Rheea fibre, the whole to be the produce of the party tendering it, and to become the property of the Society, to be accompanied by a detailed statement of the process followed in its cultivation, and after preparation and the cost of the same. The quality to be approved by the Society, and the fibre to be in a fit condition for the English market. Rs. 1,500 and gold medal.

Cotton (Exotic) long staple variety.

For the production of at least 10 mds. of good merchantable Cotton raised from foreign seed of the BLACK SEEDED LONG STAPLE kind. Rs. 1,000 and gold medal.

Cotton (Indigenous.)

For the production of at least 5 mds. of Cotton raised from indigenous seed, of a quality superior to that now exported, and such as is likely to prove a substitute for the Upland Georgia or New Orleans Cotton of the United States of America. Rs. 500 and gold medal.

N. B. The producer or producers of the above cotton must submit to the Society a statement of the mode of cultivation and cost of the same.

Substitute for Gutta Percha.

For the discovery and production to the Society of any new substance, the produce of India, which can be successfully used as a substitute for Gutta Percha. Rs. 500 and gold medal.

Materials for paper making.

To the producer of at least 6 mds. of fibre suitable for manufacturing into fine paper such as will prove an efficient and economical substitute for rags or other materials at present employed in India for that purpose. Rs. 500 and gold medal.

Quinine-yielding Plants.

To the introducer of 20 healthy plants of South American Cinchonas of the kind or kinds known to yield the best description of bark. The gold medal.

Substitute for Turkish Box.

To the discoverer of any wood indigenous in India, and procurable in sufficient quantity, which shall serve as an efficient substitute for Turkish Box, especially for wood engraving. Rs. 500 and gold medal.

Premia for Essays on certain Subjects.

For an approved essay on the following subjects :—

1. For the best practical essay on the production and relative cost of the various oil seeds of India, suitable for export. A premium of Rs. 500.

2. For the best practical essay on the present state of the cultivation of the Date Tree in Bengal, and on the best mode of increasing its production and improving the manufacture of its sugar. A premium of Rs. 500.

3. For the best practical essay on the present mode of cultivating and manufacturing Indian fibrous yielding plants known in commerce, such as jute, sunn, &c., with practical suggestions for their improvement. A premium of Rs. 500.

4. For the best practical essay on the present mode of cultivating and preparing the various tanning products of India, with practical suggestions for their improvement. A premium of Rs. 500.

The Council, in recommending the above report for adoption, suggest that the following words be added to the list of Premia, under the head "Rheea fibre":—"In the event of there being more than one competitor for the prize, the premium to be adjudged to the best specimen."

After a few more verbal additions, it was moved by the Rev. J. Long, seconded by Mr. Carter, and *resolved*—that the Report be adopted, with the exception of the clause relating to "substitute for Quinine," which, it was agreed, should be referred back to the Special Committee for re-consideration.

In connection with the above it was also resolved that a premium be offered for a Gardener's *Vade Mecum,* and that the Council be requested to arrange the necessary details.

The green Dye Plant of China.

A report from Mr. McMurray was next submitted respecting the Chinese green dye plant, and the mode adopted by him in cultivating it: the specimens alluded to in the report were also placed on the table.

In the same paper, (his usual monthly report) Mr. McMurray introduces the following calendar of operations in the kitchen, fruit and flower garden for the present and beginning of the ensuing month :—

In the kitchen garden earth up American maize corn, and pinch off the side shoots should any have made their appearence. Keep in reserve in pots a few horse-radish plants in case those in the ground may be killed during the rainy season. Strip part of the bringall plant roots, and manure with cowdung, and cover in the whole with the soil previously removed. Sow towards the end of this month in gumlahs, celery, cabbage, cauliflower, asparagus, globe artichoke and leeks; place the whole under cover and water sparingly; when the seed has germinated, prick out and place the plants in as airy a situation as possible, but guard against rain until the plants gather strength when the whole may be turned out of doors. Mould Jerusalem artichokes. Keep drains open, and the walks and grounds as clear of weeds as possible. In the orchard, continue to propagate from grafts, layers and goottes, and renew and form new plantations of old kinds of fruit trees; look to the drains and see that no water lodges any length of time in a stagnant state, as nothing tends more to the destruction of most plants than that. Where grafting to any extent is carried on during the year, seedlings of the different species intended to be propagated should now be collected and set out in nursery rows, ready for lifting at any time required for the purpose. In the flower department the several varieties of plants intended for competition at the ensuing flower shows during the cold season should at this time get their final shift into the flowering pot; and where not done the last month, established specimens should be looked to and the work done as recommended last month. The different kinds of *Achimenes* will, at this time, be in full flower; to strengthen the plant and enlarge the flowers, liquid manure should be given to the plant once a week, and care be taken that they never get dry, otherwise the plants are liable to die down, and will not again produce flowers before the end of the cold season. *Funkia cordata* will also be showing flower at this time, which requires the same attention with liquid manure and good supply of water; such of these as may not have flowered or are likely to flower this season should have their roots divided and each planted out separately in a pot. Flower borders should get an occasional dressing, a spade is the best instrument for that purpose, as the labourer, by using a codally, tramples the ground as fast as he turns it up, while working with a spade, his work is kept before him. Keep the scythe going, as vegetation at this time is making rapid progress, and unless kept down as much as possible, will cause an unsightly appearance about the ground, and be injurious to health. Continue to keep the walks clear of weeds, and the drains clear of any obstruction, so as to permit the free escape of surface water.

Flax culture in Upper India for the sake of fibre.

Read a letter from C. Gubbins, Esq., Allygurh, dated 26th June, on the above important subject.

Communications on various subjects.

Letters were also read :—

1. From the Right Hon'ble Sir Lawrence Peel, London, dated 17th May, to the following effect :—

"I have received your kind letter informing me that the Agricultural and Horticultural Society of India have elected me an Honorary Member of the Society. I beg that you will communicate to the Society my grateful sense of the honor conferred upon me by that election, and my wish to be employed here in any mode in which I may be able to advance the interests of the Society. I beg also that you will accept my thanks for the favour of your communication."

2. From G. H. W. Thwaites, Esq., Superintendent of the Royal Botanic Garden, Ceylon, dated Kandy 19th June, announcing the establishment of an Agricultural and Horticultural Society at Kandy, of which he has been appointed one of the Honorary Secretaries, and requesting information on the subject of seeds, &c. Mr. Thwaites adds, "I have been requested to ask you to put us in the way of obtaining the Transactions of your Society, which would be very valuable to us for reference."

Resolved, on the recommendation of the Council, that a complete set of the Transactions of this Society be sent to Mr. Thwaites, and as many numbers of the Journal as may be available, for this newly established Society.

3. From Dr. Thomson, Superintendent H. C. Botanic Garden, intimating the sanction of Government to the transfer of the piece of ground applied for by the Society in April last, on the same conditions as when a previous grant was made. Agreed that these conditions be conformed to.

4. From J. H. Gouldhawke, Esq., Rungpore, dated 27th June. Mr. Gouldhawke writes:—"I would desire to mention to the Society a strange circumstance connected with that kind [Demerara] of indigo; that although not a single pod of seed formed on the plants I had last year, and all of them died, the land being sown with mignonette, still this year three plants have come up, I imagine, from seeds that did not vegetate last year and remained in the soil."

In connection with the above, the Secretary read the following remarks from Mr. McMurray:—

"With reference to the Demerara indigo plants, in some cases they are annual and in other perennial; for instance, if a plant produces much seed the first year after sowing it generally dies, but if only a little it succeeds the second year; and in some cases if no seed at all be yielded the first year, the plants are more likely to stand the second year, and become deciduous or lose their leaves during the cold season: in some instances, when very cold in January, the plants die down to the ground, and spring up again in March. The plants now in the garden were sown in gumlahs in March 1855, and were not planted out last year during the rains, from which circumstance, I think no seed has been produced. The plants now in the ground will probably produce seed during the month of November."

5. From Messrs. Peter Lawson and Son of Edinburgh, dated 8th May, annexing invoice and bill of lading of the Dutch and Riga Flax and Potato seed shipped per *City of Delhi,* which sailed from Glasgow on 6th idem Messrs. Lawson have also sent by the same opportunity a small quantity of vegetable seeds in lieu of those which failed last year.

The Secretary announced the receipt from the Government Garden at Ootacamund of a small assortment of vegetable seeds, which was ordered in February last at the suggestion of the Garden Committee; he also submitted a list of gardens and members in various parts of the country among whom the Council recommend the seeds should be divided, with the request that they will furnish, in due course, the result of sowings and the quality of produce, as a guide to the Committee for future orders from the same locality. Agreed to.

The Secretary also placed on the table a few copies of the prospectus of the recently established "Chartered Colonial Fibre Company," which he had received by the last mail from Mr. J. B. Sharp, the Secretary. He also drew attention to the following extract from the report of Mr. Nathaniel Wilson, Curator of the Botanical Garden at Bath, in Jamaica, to the

Directors, dated 28th January, 1856, respecting the introduction into that Island of the China grass cloth plant, the Rheea of Assam, and the propriety of turning to profitable account their numerous indigenous fibrous-yielding plants, which are at present quite neglected :—

"I have now the happiness of recording my entire success in the cultivation of the Chinese grass-cloth plant, (*Boehmeria nivea*) introduced in 1854, and a more valuable introduction could not have been made. I find the plant thrives here with a luxuriance equal to any of our native plants, and probably with more vigour than it does in its native clime. This plant, (as it is now well known) produces the best fibre for textile purposes with which we are acquainted, and, according to undoubted authority, is worth in the London market from £80 to £120 per ton, which is surely sufficient to render the plant an object worthy all the attention we can bestow on it if new staples for general and profitable cultivation be desirable. I have no hesitation in saying that by its spontaneous and luxurious growth a more desirable and appropriate plant for tropical culture has never before been submitted to the notice of the public. But it is unnecessary for me here to enter further into details respecting this plant : suffice it to say that it could, by an energetic and industrious people, soon become a source of wealth : the economical history of the long famed grass-cloth of the Chinese goes far to justify these anticipations. I. have thirty-six of these plants ready for distribution, and could, by a small expenditure, increase the number to any reasonable extent. In my last report, I brought to your notice a number of textile plants, accompanied by upwards of fifty samples of fibre, and recommended them as being eminently adapted for general and profitable cultivation, being a highly important addition to the agriculture and commerce of the country : since then every circumstance has tended to prove that my estimate of them was by no means over-rated, their superiority has been fully admitted both in Europe and America, where samples of the fibre have been exhibited. General opinion, and the importance of commencing the cultivation of new staples, will, I am sure, be sufficient to plead my excuse for bringing the subject again to your notice. We have here a vast number of native plants forcing themselves on our notice, as eminently and indisputably calculated to hold a place among our staples, second only to the production of sugar. It is worthy of remark to state here, that, for every other description of cultivation, we are indebted to importation for the plants ; but here we have fibrous plants in great variety and abundance growing every where, and any where, wherever a plant or seed chances to drop, by accident or design, in the sun or in the shade, in arid or sterile places, on rocks, or in swamps ; and many of the forest trees are actually borne down and destroyed by them ; indeed, it would seem that these plants have taken possession of the country, and will keep it to the detriment of every other production, reproaching, as it were, the inhabitants with indolence and neglect, by allowing them still to retain undisturbed possession. I would, therefore, beg to recommend to this honourable Board, the general advantage to be derived by the country, in bringing this branch of industry prominently to the notice of the Legislature, as one of national importance deserving the most mature consideration."

For all the above presentations and communications the best thanks of the Society were accorded.

(Wednesday, the 13*th August,* 1856.*)*

W. G. Rose, Esq., Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed, and the gentlemen then proposed were elected Members, *viz.* :—

Captain W. H. Lowther, Colonel A. M. Becher, Major F. Knyvett, Dr. H. H. Bowling, Messrs. A E. Cockerell, Civil Service, J. C. Murray, R. J. Wigram, Civil Service, Lieut. Henri Campbell, Messrs. James Young, Civil Service, C. B. Wood, J. H. Aubrey, James Egerton, J. H. Barry, R. Alexander, Civil Service, and A. N. Clark.

The names of the following gentlemen were submitted as candidates for election :—

Lieut. Forbes, Supervisor of the Ganges, Benares ;—proposed by Major R. Ouseley, seconded by the Secretary.

D. Jenkins, Esq., Mirzapore ;—proposed by Mr. W. G. Rose, seconded by Mr. C. A. Cantor.

Joseph Haywood, Esq., C. E., Futwah ;—proposed by Mr. Jenkinson, seconded by Mr. A. T. Peterson.

T. P. Ockelton, Esq., Calcutta ;—proposed by Baboo Peary Chand Mitter, seconded by Baboo Ramgopaul Ghose.

James Simson, Esq., Civil Service, Azimghur ;—proposed by Mr. M. Wylie, seconded by Mr. W. G. Rose.

Lieut. G. Snell, B. A. (64th N. I) 2nd in command, 10th Regiment Oude Irregular Cavalry, Seetapore ;—proposed by Mr. Cantor, seconded by the Secretary.

J. J. Wallis, Esq., Merchant, Moulmein ;—proposed by Mr. H. G. French, seconded by Mr. C. N. Begbie.

Captain D. Brown, 1st Madras Fusiliers ;—proposed by Captain F. W. Baugh, seconded by Major W. Martin.

Major-General J. B. Hearsey, C. B., 6th Light Cavalry ; —proposed by the Secretary, seconded by Mr. Cantor.

Edward Johnson, Esq., Narcoolbarea, Merai ;—proposed by Mr. Rose, seconded by Mr. S. H. Robinson.

H. Doveton, Esq., Deputy-Magistrate, Buheera, Tirhoot;—proposed by Mr. W. Duff, seconded by the Secretary.

Dr. J. C. Collins, Civil Surgeon, Darjeeling;—proposed by Major-General Garstin, seconded by Mr. Cantor.

J. E. Warner, Esq., Kishnaghur;—proposed by Mr. R. Blechynden, seconded by the Secretary.

Presentations.

The following presentations were announced :—

1. Royle on the Culture and Commerce of Cotton in India (2 copies). *Presented by the Government of India.*

2. Report on the Government Botanical and Horticultural Garden at Ootacamund, 1854-55. *Presented by the Government of Bengal.*

3. Lawson's Agriculturist's Manual. *Presented by Messrs. Peter Lawson and Son.*

4. On the weaving of Linen as practised in Belgium. *Presented by James Scott, Esq.*

5. Journal of the Asiatic Society of Bengal, No. 3 of 1856. *Presented by the Society.*

6. A few Walnut Plants. *Presented by Major R. Ouseley.*

7. A quantity of Irish filberts for sowing. *Presented by C. B. Stewart, Esq.*

8. A collection of seeds, exotic and indigenous, and a plant of *Ipomœa polyanthes*. *Presented by Captain W. H. Lowther.*

9. A plant of *Coleus Blumei*. *Presented by R. F. Ross, Esq.*

10. A small quantity of California potatoes. *Presented by C. Huffnagle, Esq.*

11. Two boxes of Van Diemen's Land potatoes. *Presented by Captain Harris, of the Barque "India."*

It was agreed that a portion of these potatoes,—which are of a remarkably fine description,—be transferred to the Society's Garden, and the remainder reserved for distribution to Members desirous of giving them a trial: further, that five maunds be purchased for trial at Cherra Poonjee.

12. Four quarts of tobacco seeds of sorts raised at Sandoway, from Java Philippine Islands, Dutch and German stock. *Presented by Captain F. W. Ripley.*

13. A specimen of Cashewnut Oil. *Presented by C. B. Wood, Esq.*

14. A specimen of Roosa Grass Oil. *Presented by Dr. Riddell.*

15. Sundry samples of Cotton raised at Colonel Hannay's plantation at Debrooghur. Received from the Board of Revenue.

(Referred to the Committee for report.)

16. Five carpets of various sizes and patterns, manufactured at the jail at Shahpore, in the Punjab, from the floss of the Muddar (*Calotropis gigantea*). *Presented by Major G. E. Hollings.*

17. A very neatly finished model of a bullock cart, fitted with a self-adjusting break. *Presented by Dr. S. Clark, Officating Post-Master-General N. W. P.*

18. Two small specimens of Wood from the Punjab. *Presented by Lieut. Col. W. Swatman.*

The following is extract of Col. Swatman's letter on the subject, dated from Agra, 30th July :—" Observing in the proceedings of the Society that enquiry is going on for a substitute for box or other wood fit for engraving purposes, my recollection has recalled to me that when at Lahore I was wont to obtain a wood for my turning lathe very similar, if not identical, with box. I have no perfect specimen of it left, but the enclosed piece cut across the grain will in some measure demonstrate its quality, although this is probably a very inferior specimen, as I have seen a much deeper colour and closer grain. I imagine the wood finds its way from the Chumba range to Lahore. There is another finer kind of wood which I also found at Lahore (Specimen No. 2.) It is used for the manufacture of combs and is a very fine soft grain. I have never seen a larger diameter than two or three inches ; but I send these to you, not as being any certain novelties, but merely to run the *chance* of their being unknown. They are very possibly common and valueless for the required purpose."

Colonel Swatman was requested to favor the Society with larger specimens of these woods.

Two well-grown plants, in flower, of *Æschynanthus* species and *Tacca lævis,* from Mr. B. Warwick's garden, were placed on the table, as novelties in Calcutta gardens. The first-named plant, which has been found so difficult to flower, was much admired.

A report was read from the Special Committee on Premia, to whom was referred back for reconsideration the clause in their report submitted at the last meeting, relating to "substitutes for Quinine." The Committee adhere to their previously expressed opinion that it is unnecessary for the Society to offer to pay for what they conceive is being done quite well without its assistance. The report was received.

Prize for a Gardener's Vade-Mecum.

In accordance with the Resolution passed at the last General Meeting, the Council submitted the following details respecting a prize for a Gardener's *Vade Mecum :*

" To any person who shall produce on, or before the 31st December, 1857, the best practical Treatise on Gardening as applicable to Lower Bengal, or a Gardener's *Vade Mecum,* the sum of six hundred Rupees.

The work must afford full directions for the culture of Vegetables, Fruits and Flowers, whether indigenous, or such as have been introduced into

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Lower Bengal to the present time, giving practical hints from personal experience and observation, on grafting, budding, pruning, and transplanting, with descriptions of soils and manures best adapted to certain plants. A calendar of operations in the Kitchen, Fruit and Flower Garden, for every month throughout the year must be added, as also a copious Alphabetical Index.

Conditions.

1st. The Society reserves to itself the right of withholding the above prize, should none of the Treatises be approved of by the Adjudicating Committee.

2nd. The Treatise to become the property of the Society for publication in its Journal, or otherwise, as may be deemed fit: and one hundred copies to be placed at the disposal of the author, free of charge."

Baboo Peary Chand Mittra desired to give notice of motion for the next meeting, that the sum of Rs. 600 be reserved for the above purpose.

Nursery Garden.

The Gardener's usual monthly report was read, of which the following is an extract:—

"In drawing up my report for the month of July last I have first to state that the Cape and American vegetable seeds of this season's importation have turned out in general very satisfactory. The Ootacamund vegetable seeds have not as *yet* proved so good as either of the above consignments. However, for the accurate information of the Society, the usual tabular statement will be prepared for laying before the next general meeting, wherein the result of each kind will be separately shown.

"The new kinds of Peach trees presented to the Society in 1854 by Dr. Jameson, Superintendent H. C. B. Garden, Saharunpore, and F. A. Glover, Esq., of Tirhoot, have been sufficiently increased this season to enable me at present to state that from eighty to one hundred plants (grafts) of these trees will be available to members by the end of this month at the fixed scale of prices. In addition to the above, I have on hand one hundred and twenty-five (125) healthy seedling mahogany plants, for which there is no charge to members, but the usual price of pots. This would be a noble tree for the Railway Superintendent to have planted on each side of the line, and by carrying the tree as far as practicable up the line, a good comparison of the wood produced by the different kinds of soil and variation of climate through which the railway will pass, might be made at some future day.

"The plant which Mr. F. Pereira presented to the Society in February 1853 as the "*Agave Mexicana*" is at present in flower in the garden, and turns out to be the *Fourcroya gigantea* of South America; it fully bears out its name in this country from the rapid and stately growth the plant makes, when of sufficient age and strength to throw out the flower spike; this plant commenced to show its flower spike at the end of May last, and by the middle of July following had made a growth of thirty-one feet in height, with forty-two branches, the longest of which is from ten to twelve feet, and they are actually laden down with little light green bell shape flowers to the very tips of the boughs."

Mr. M'Murray then gives, in detail, a list of contributions to the garden during the past month (most of which have been already included under the head of presentations), and closes his report with the following calendar of operations for the present and beginning of the ensuing month:—

"*The Kitchen Garden.*—The work to be done in this department at this season is of the greatest importance, and should be pushed forward without delay, and every attention should be paid to the young stock raised under cover in July, so that a few kinds of the more tender vegetables may be ready at Christmas. Cauliflowers, celery, lettuce, and the more tender kinds of cabbages will rank amongst these, so that the greatest care should be taken to shift the seed gumlahs to the most light and airy situation in either the conservatory or verandah, so soon as the seeds begin to germinate, otherwise they are sure to damp off in the course of two or three days after making their appearance; but by a little care of this kind the success is sure: the pricking out should commence as soon as the two rough leaves are fairly formed: at the time of pricking out see that every seedling be dibbled in right up to the neck or seed leaves, as by that the plants will be strengthened by the *roots* which will *spring* out *right* up the *stem.* When the rough leaves are formed, a second pricking out should take place into a raised bed in the garden, which should have a frame work of bamboos placed round it, on purpose to bear up a mat to spread over the plants while raining. On this occasion, as before mentioned, the plants should be pricked out right up to the neck, and, when of sufficient size and hardiness, removed with little balls of earth into the open plot—still keeping a reserve to fill up any blanks which may take place from deaths. It must be observed that at the time of each pricking out, the plants be put thinner in each gumlah, bed, or other place, as by crowding them together, damping off is sure to take place. The ground for cauliflowers, cabbages, celery, &c., cannot be made too rich, in fact the richer the ground the richer and more tender the vegetables will be, and not half the quantity of water will be required; but on this subject much requires to be said. Mustard and cress should be sown every ten days on raised beds; radishes of all kinds should also be sown in raised beds, and covered with mats raised upon the proper bamboo frame; globe artichokes and asparagus, where not sown during the last month, should also be put into the ground during the present. Turnips sown thinly over the raised bed, protected with mats, will be likely to succeed by the end of this month. Sow cauliflowers, cabbages, lettuces, nole-kole, brocoli, and small sallads every ten days in small quantities, and prepare beds for pricking out. Keep the draining open and the ground as tidy as the present state of the weather will permit.

"*In the Fruit Department* continue the grafting of all kinds of trees and making layers; plant out, and keep the draining open, and if necessary, make more to carry off the water.

"*In the Flower Garden* preparation should be going on to have the soil and gumlahs kept in readiness for sowing the English and other tender flower seeds; the compost for these seeds should be composed of equal parts of leaf mould and peat, with about one-fifth sand, which should be well mixed together and kept dry for the occasion; the gumlahs should be well washed, if previously used; the shreds, or cracking material, should also be clean so as to make sure of good drainage; when cracking the seed gumlah, see that the necessary vent for the escape of water at the bottom be large enough, if so, then place a large piece of a pot first over the hole and round that a number of smaller bits until you be sure you have got a good drainage; over that a little moss or other material to keep the soil from mixing with the drainage; then fill up the gumlah to within one inch of the rim, level with the hand, and with the bottom of a dry pot press and level the whole down slightly by which you have now a level bed to sow your small seed on, and by which means you can see that there is not more seed sown in one place than another, and that the whole of the seed will be covered evenly with mould and come up alike or at the same time; seeds should be watered lightly as soon as sown, and never get more at any time, but let it be given frequently. When germination takes place, shift the gumlahs to the most light and airy situation, as recommended for vegetables, and let the pricking out be recommenced on as soon as the first two rough leaves are formed.

"The covering in of small seeds, such as annuals generally are, is one of the parts of the operation in which great care should be exercised; for instance the seed of *Lobelia* does not require half the depth of covering as the common convolvolus, or balsam; the latter will come up if covered one inch beneath the ground, while the former will not germinate in damp soil but die; I am persuaded that many of the seeds complained of as being bad are killed from this circumstance alone. In place of covering small seed, such as the *Lobelia*, merely sprinkle a little light dry soil amongst them, and never upon any account use wet soil for this purpose, as the seeds cannot be covered in evenly with it in such a state. Balsams, convolvolus, pinks, petunias, antirehinums, cupheas, lophospermums, martynias, narsturtions, œnotheras, sweet williams and gaillardias, may be sown during the present month, but the general number of foreign annuals succeed better by being sown about the first week in September."

In connection with gardening operations, Dr. Thomson brought to the notice of the meeting that there were many young plants of *Musa superba*, as many as 1700, available to members of the Society, and to the public generally, which had been raised in the H. C. Botanic Garden, and which he would be glad to distribute on application. The plant in question, the wild plantain of Southern India, does not produce, Dr. Thomson stated, an eatable fruit, but it is a very ornamental species, producing a very large head of flowers.

The Muddar Plant,—its useful properties.

The subject that next occupied the attention of the meeting was the various useful products afforded by the muddar plant (*Calotropis gigantea*), as exemplified, more especially, by certain carpets placed on the table which had been manufactured with the downy filament contained in the follicle, or seed-pod, of that plant.

Communications on various subjects.

The following communications were likewise submitted :—

1. From Captain W. H. Lowther, on the plant *Giseckia pharmaceoides*, as a specific for Tœnia.

2. From Secretary Board of Revenue, a report from Colonel Hannay, respecting his cotton experiments at Debrooghur.

3. From the same, copy of a letter from the Magistrate of Sylhet respecting the discovery of the tea plant in his district.

4. From Dr. John Mayer, Madras, a printed report of his analyses of the mineral constituents of the flax plants, with a few additional remarks on the same subject.

The above four communications were referred to the Committee of Papers.

5. From Dr. Riddell, on the oil of the "Desee Akroot", (*Aleurites triloba*) :—

"Some two years ago I sent to a friend in London, Mr. Snowden, Chemist and Druggist, of Basingah Street, a few pounds of the kernels from the nuts of the *Aleurites triloba*, with the view of ascertaining whether they suffered in any way from being either pounded or broken before shipment for England. In one jar was put sixteen pounds weight of pounded kernels, in another five pounds ten ounces of the kernels as when taken from the broken shell with 100 nuts unbroken. These latter were intended merely to show the fruit as grown from my garden in the drupe. They were sent in 1854, and would appear to have kept good until pressed. Mr. Snowden's letter is dated June 19, 1856..

'I received the two jars of nuts in good condition, without loss of weight and not at all rancid.

'The whole was as little as could be pressed in an hydraulic press, therefore I had all pounded and pressed together ; they yielded just one-half of their weight of a sweet and clear oil, somewhat resembling that of almonds, or of poppy. There are many kinds of oils obtained from different seeds or nuts imported here, but I have seen none so new as this, except those above mentioned. The others are generally used as a substitute for, or to mix with common olive oil.' "

6. From Daniel Hanbury, Esq., London, dated 18th June, respecting the Atees powder forwarded to him in April last. The following is extract of Mr. Hanbury's letter :—

"I have to acknowledge the receipt of your favor of 21st April, and also of the little box containing two vials of the powdered root of *Aconitum heterophyllum*, Wallich.

"Although Dr. Thomson has written to me upon the subject, I confess I am in some doubt how I shall best meet your wishes in instituting some experiments upon the drug.

"The quantity is too small for any *chemical* examination, and the *medicinal* properties of the *Atees* seem to be already determined.

"I intend, however, to confer with my friend Dr. Royle on the subject, and trust I shall find some channel through which the drug you have sent me may meet with some useful application."

The Secretary was directed to obtain a much larger quantity of the powder for transmission to Mr. Hanbury.

7. From the Secretary Government of Bengal, offering, by desire of the Lieutenant-Governor, to place at the disposal of the Society, a number of American ploughs and spare shares.

Resolved—that they be accepted with best thanks and distributed to Members desirous of giving them a trial.

8. From G. H. Thwaites, Esq., Secretary A. and H. Society Ceylon, dated 18th July, to the following effect :—

"The Kandy Agricultural and Horticultural Society wishes to give a stimulus to the cultivation of cotton in Ceylon, the soil and climate of many parts of the island seeming well adapted for it; indeed it is already produced in small quantities in many districts. We of course wish to introduce the better kinds of cotton in place of the inferior sorts now principally grown, and we shall feel particularly obliged if you would inform us of the best plan of getting from time to time supplies of *fresh* seeds from India. Could your Society oblige us, or would it be better for us to get what we require from Madras? We should also be very glad to get Dr. Wight's papers on the subject of cotton cultivation."

The Secretary reported that he had referred Mr. Thwaites to the Journal of the Society, of which a complete set had been recently placed at the disposal of the Ceylon Society, for Dr. Wight's reports ; he had further suggested a reference to the authorities at Coimbatore and Tinnevelly for cotton seed, as also to the Governor of Mauritius for a supply of seed from the Seychelles Islands.

9. From Messrs. Grindlay and Co., acknowledging receipt of the bales of straw of different kinds which had been sent for transfer to the Chevalier De Claussen for trial as substitutes for rags for paper manufacture.

10. From Messrs. D. Landreth and Son, Philadelphia, advising despatch of the Society's consignment of vegetable, maize and cotton seed.

11. From Messrs. Villet and Son, Cape of Good Hope, to the same effect.

For all the above contributions and communications the best thanks of the Society were accorded.

(*Wednesday, the* 10*th September*, 1856.)

W. G. Rose, Esq., Vice-President, in the Chair.

The gentlemen proposed at the last Meeting were elected Members, viz. :—

Lieutenant Forbes, Messrs. D. Jenkins, J. Haywood, T P. Ockelton, James Simson, Civil Service, Lieutenant G. Snell, Mr. J. J. Wallis, Captain D. Brown, Major-General J. B. Hearsey, C. B., Messrs. Edward Johnson, H. Doveton, J. E. Warner, and Dr. J. C. Collins.

The names of the following gentlemen were submitted as candidates for election :—

George Brown, Esq. (firm of Jardine, Skinner and Co.,) ;—proposed by Sir Arthur Buller, seconded by Mr. S. Douglas.

Henry Rait, Esq., Galimpore, near Surdah ;—proposed by Mr. C. R. Jennings, seconded by the Secretary.

Hermann Schmidt, Esq. (firm of Oxford and Co.,) ; -proposed by Mr. J. Agabeg, seconded by Mr. James Cowell.

G. M. Blacker, Esq. (firm of Hoare, Miller and Co.,) ;—proposed by Mr S P. Griffiths, seconded by Mr. C. E. Creswell.

G. F. Cockburn, Esq. Civil Service, Cuttack ;—proposed by Mr. J. R. Ward, seconded by Mr. S. Douglas.

George DePenning, Esq. Calcutta ;—proposed by Baboo Peary Chand Mittra, seconded by the Secretary.

F. J. Fergusson, Esq. E. I. Railway, Lucky Serai ;—proposed by Mr. Griffiths, seconded by Mr. E. W. Wingrove.

William Peskett, Esq. M. D. Civil Surgeon, Simla ;—proposed by Mr. C. Gubbins, seconded by the Secretary.

Edward Miller, Esq. (firm of Hoare, Miller and Co.,) ;—proposed by Mr. S. P. Griffiths, seconded by Mr. C. E. Creswell.

W. C. Sterndale, Esq. Calcutta ;—proposed by Mr. W. Haworth, seconded by the Secretary.

G. W. Wingrove, Esq. Calcutta ;—proposed by Mr. E. W. Wingrove, seconded by Mr. Griffiths.

John Johnson, Esq., Merchant, Calcutta;—proposed by Mr. Haworth, seconded by the Secretary.

The following presentations were announced :—

1. Journal of the Asiatic Society of Bengal, No. 4 of 1856. *Presented by the Society.*

2. Narrative of a Horticultural Tour in Flanders, Holland and North of France (one volume). *Presented by Captain W. H. Lowther.*

3. Returns of the Revenue Survey of India. *Presented by James Morris, Esq.*

4. Four specimens of oil, namely, of radish seed, neem seed, tamarind seed, and roosa grass; (one was also sent of the *cheeroongee* seed, but it oozed out during transmission); and a small cup from the juice of the muddar. *Presented by Captain Thomas Davies, Superintendent of Berar Police, at Booldana.*

The Secretary was directed to obtain a further quantity of the tamarind oil from Captain Davies, when the whole can be transmitted for report to the Society of Arts.

5. Specimens of clays from the station of Persuddipoor, in the Province of Oude: of Himalayan Box, and of *rusot,* the inspissated juice of *Berberis aristata. Presented by Captain W. H. Lowther.*

The following are Captain Lowther's remarks regarding the wood; those on the "Rusot" were transferred to the Committee of Papers.

"The box wood is produced along the range of mountains *en route* to Cashmere; also on the Sub-Alpine Himalayas in Kemaon, Gurhwal and towards Mussooree. The box trees on the first mentioned chain grow to a very considerable size, and in some localities constitute a large proportion of the forest vegetation."

6. A specimen of sugar cane from the interior of Sugeine and the islands round Moulmein. *Presented by Mr. T. J. Butler.*

These fine canes, which are stated by Mr. Butler to be indigenous to Sugeine, are similar in appearance to the red Bombay cane. Mr. S. H. Robinson undertook, at the request of the chairman, to report on the quantity of juice, &c., obtainable from them.

7. A number of American ploughs and several spare shares. *Presented by the Government of Bengal.*

Resolved, that these be distributed to members desirous of giving them a trial.

8. A further supply of *Atees* powder. *Presented by Captain Lowther, on behalf of Mr. Sub-Assistant Surgeon Henning of Oorai.*

Resolved, that it be transmitted to Mr. Hanbury.

9. A few specimens of potatoes raised at Cherra from California and Bangalore stock forwarded last year by the Society. *Presented by C. K. Hudson, Esq.*

These potatoes appear fully equal to the original stock.

10. Several specimens of Hill fibres. *Presented by George Jephson, Esq.* (*Referred to the Flax Committee.*)

11. A sample of wood from Jubbulpore. *Presented by J. B. Williams, Esq.*

"I have posted to your address by banghy"—writes Mr. Williams,—"a sample of the wood used by me at the Government School of Industry for cutting our chintz blocks, and which appears to me to be nearer the Turkish box, than any other kind procurable in the Saugor and Nerbudda territories, If it is found on trial to answer the purpose of the wood engravers in England, large quantities can be obtained from the forests in this district at a cheap rate."

Mr. Williams was requested to favor the Society with specimens of the leaves, flower, and fruit of this tree.

Various specimens of wood from Simla and Beerbhoom, were submitted by Lieutenant J. F. Pogson, and Messrs. George Jephson and O. W. Malet, as substitutes for Turkish box.

Resolved, that these be retained till further specimens are submitted for comparative examination and report.

A small quantity of seed of the green dye plant of China, the produce of the Society's garden, was also placed on the table.

The Gardener's monthly report was read. Mr. McMurray submits a tabular statement of the sowings of the three batches of vegetable seeds received from North America, the Cape, and the Government garden at Ootacamund; "from which it will be seen that the American seeds are the best, the Cape the second, and the Ootacamund all but a total failure, although every attention was paid, and four successive sowings made before I was satisfied. The Cape and American seeds, taken as a whole, give a good return. The Dutch Flax seed has, in three days, yielded one hundred per cent, and the Riga flax twenty, but the latter kind may yet give a further per centage, as this is only the fourth day the seed has been in the ground. In addition to supplying all the Members whose names have been registered with plants of *Amherstia nobilis*, there will still be a stock on hand of 24 plants, which may be made available to any of the Members desirous to grow this handsome tree; we have also about 600 Ceylon coffee plants in fine order for distribution."

The Gardener next gives, in detail, several contributions, and closes with a calendar of operations for the present and beginning of the ensuing month:—

"*Conservatory.*—The succulent pot plants in and about this department, will most probably suffer from the bright days and strong sunshine that may soon be expected after so much rain, while the tissues of the plants are unprepared for the sudden change, therefore the greatest attention should be paid to such plants to see that the more delicate kinds are put under cover for a time, and that a sufficient quantity of water be given at all times to the whole, in order to keep up a uniform moisture and growth in the plants.

"The Annuals that were sown at the commencement of the rains will now be casting their leaves, and causing a naked untidy look about the flower ground; the whole of such stuff should be cleared away, and the ground forked up for a succession crop of the more delicate autumnal kinds which should be sown at once in gumlahs, as recommended last month. Use the scythe freely, and keep the grounds free of weeds and other decaying matter.

"*In the Orchard* the grafting of peach trees may be continued for ten days more with advantage, and the layering of the several kinds of the citron family may be put down with equal success. Young plantations of all kinds of fruit trees should now be made so as to have the plants well established in the ground before the fall of the leaf in November. There is an advantage in planting out of fruit trees at this season, namely, three growths will be obtained from the same plant next season, the first beginning in February, the second in June, and the third from September to the fall of the leaf in November; that it is only by having the plants established in the ground during this and beginning of the next month that so good and vigorous growths can be expected. As soon as there are signs of the rains being over, lose no time in stirring the soil with a fork round healthy planted fruit trees to prevent the ground from cracking and injuring the roots; attend to the staking of young fruit trees in pots and in the ground.

"*In the Kitchen Garden* the seedling plants of cauliflowers, cabbages, nole-kole, &c. raised in July, will by this time be sufficiently advanced to stand planting out into the open ground; the *Brassica* tribe, delight in a deep rich damp soil, so that there need not be any doubt of success if the plants be large enough to stand a good pelting shower.

"Trenching the ground two feet deep at this time is beneficial, and by so doing the whole of the herbage will be buried, and soon will decompose by being turned to the bottom of the trench, and will add materially to enrich the earth, and the trenching will open the soil and encourage a free action of the roots, which otherwise cannot be expected from the sodden state in which the ground is at present after so much rain. Continue sowing in small gumlahs the whole of the *Brassica* tribe, lettuce, celery, turnips, &c., &c., and attend to the directions given in former calendars.

Sow parsley on very slightly raised beds of light rich soil fully exposed in an open situation, and continue preparing ground for succession crops and collecting well decomposed manure, but avoid as much as possible the use of green manure to young seedling plants, as nothing deters their growth more than such rank material.

"Put in a small breadth of French beans on a high and open situation, and plant a quantity in small pots to be raised in the conservatory and planted out as soon as the heavy rains are over. Sow radishes in small quantity on raised beds every ten days, so as to secure a regular supply daily in a fit state for use. When ground is not at the disposal of the amateur, the turnip-rooted radishes may be cultivated with equal success in gumlahs placed in the verandah, or even tops of houses: a few gumlahs to keep up a succession filled with a light rich compost, and a sufficient supply of water at all times with light and air, is all that is necessary to accomplish this object; keep the drains in all departments of the garden clear, and remove all decaying rubbish without delay to some out of the way corner, and keep the scythes going and the ground generally as clean as circumstances will permit"

In connection with the above, the Secretary submitted two tabular statements from Mr. Sharpe, Superintendent of the Barrackpore Park, of his trial sowings of the American and Cape vegetable seeds, which shew a very fair average per centage. Mr. Sharpe considers the seeds good so far as their germinating quality is concerned.

The motion of which notice was given at the last meeting by Baboo Peary Chand Mittra, that the sum of Rs. 600 be reserved as a prize for the best practical treatise on gardening, as applicable to Lower Bengal, was brought forward, seconded by the Reverend J. Long, and carried unanimously.

On the motion of Mr. Stewart Douglas, it was resolved that the words "from personal experience and observation," be omitted from the list of conditions submitted at the last general meeting.

Letters were read :—

1 From the Secretary, Society of Arts, London, dated 5th July, furnishing extract from a report which has been procured from an eminent firm in London on the specimens of fibre of the "Dheros," *(Hibiscus esculentus,)* and paper made therefrom, which were submitted by Dr. Riddell last year.

The Secretary was directed to send a copy of this report to Dr. Riddell.

2. From Thos. H Barry, Esq., reporting on certain musters of flax straw raised at Allyghur from country and foreign seed by C. Gubbins, Esq., and of which the greater portion has been forwarded to the Chamber of Commerce at Dundee.

Resolved, that a copy of the above report be sent to Mr. Gubbins.

3. From Lieutenant R. Stewart, Superintendent Keoky Levy, Cachar, submitting a paper for the Journal on Cachar, its inhabitants, and its products

On the motion of the Chairman, the best acknowledgments of the Society were voted to Lieutenant Stewart for this interesting communication.

4. From Captain W. Davies, Booldana, submitting sketches of two Churkas for separating cotton from the seed. Referred to the Cotton Committee.

5. From B. Warwick, Esq., a few remarks on the treatment of *Æschynanthus*:

"I have the pleasure to send a plant of *Æschynanthus* species, and one of the *Hibbertia* species from Texas; also some seeds of *Pharbitis limbata*, which I think you said you would be glad of for distribution. I find no more trouble in growing and flowering the *Æschynanthus* than the *Hoyas*, the one I sent to the last meeting is the offspring of one I sent in flower to a meeting three or four years ago. I believe the secret is to give the proper soil and good drainage and exposure to all weathers, but in a shady situation, so that the sun does not affect the handsome foliage, my impression is that in the rains the practice is to nurse and coddle plants too much; instead of being kept in a house, if they are exposed to the wind and rain and raised from the ground, there would be less chance of their damping off, and a good prospect of a vigorous growth. As an instance of this, I may mention that I have two or three kinds of *Achimines* flowering magnificently in the open air, indeed some of the plants are fully equal to any I have read of in England. I could also enumerate many other plants doing admirably well outside, that are generally thought certain of ruin by being exposed to the heavy and constant rain at this time of the year."

6. From G. H. Thwaites, Esq., returning the best thanks of the Committee of the Agricultural and Horticultural Society of Ceylon for a set of the *Transactions* and *Journal* of this Society.

7. From the Rev. E. H. Higgs, Debrooghur, dated August 4, respecting his trials with American maize, Chinese potato, tobacco, &c.

"I find I have omitted"—writes Mr. Higgs—"thanking you for the fine supply of varieties of maize, tobacco, West India ginger, and the tubers of Chinese potatoes. The maize was most acceptable; it happened to arrive just at the time when I had a large number of Abors down from the hills on a visit to me, they were quite astonished to see the size to which the cobs of maize had grown, and with much difficulty I prevented their seizing on the whole and carrying them off. I gave them half the quantity you sent me, and the remainder I planted myself, and the crop yielded has been very satisfactory. I have now sufficient seed to supply all the hill people next year The yam or Chinese potato some Mishmees recognized as a native of their own hills, and they told me not to plant it till June. I however planted it at once, but it was late in June before any root fibres were thrown out. I have now four or five very fine plants growing, the creeper is twelve feet high now. The tobacco seed arrived too late, and but a very small proportion of the acclimated Cuba kind germinated. The West India ginger is doing very well indeed."

8. From Messrs. James Carter and Son, dated London, 23rd July, advising despatch of the usual consignment of flower seeds.

For all the foregoing presentations and communications the best thanks of the Society were accorded.

(*Wednesday, the 1st of October*, 1856.)

W. G. Rose, Esq., Vice-President, in the Chair.

The proceedings of the last general meeting having been read and confirmed, the gentlemen proposed on that occasion were duly elected Members: viz.—Messrs. Geo. Brown, H. Rait, H. Schmidt, G. M. Blacker, G. F. Cockburn, G. DePenning, F. J. Fergusson, W. Peskett, M. D., Edward Miller, W. C. Sterndale, G. W. Wingrove, and John Johnson.

The names of the following gentlemen were submitted as candidates for election :—

Lieutenant Geo. Weld, Fort Adjutant, Chunar ;—proposed by the Secretary, seconded by Mr. W. G. Rose.

The Maharajah of Cooch Behar ;—proposed by Mr. C. A. Cantor, seconded by Mr. C. Beadon.

E. S. Pearson, Esq., Civil Service, Dacca ;—proposed by Mr. D. B. Lindsay, seconded by Mr. St. Douglas.

Baboo Chunder Coomar Chatterjee ;—proposed by Mr. Joseph Agabeg, seconded by Mr. G. Malchus.

H. C. Richardson, Esq., Civil Service, Tirhoot ;—proposed by Mr. E. F. Lautour, seconded by the Secretary.

C. W. Gale, Esq., Doorra factory, Tirhoot ;—proposed by Mr. W. Stalkartt, seconded by Mr. S. P. Griffiths.

Hamilton, E. A. Dunford, Esq., Dacca ;—proposed by Captain W. H. Lowther, seconded by the Secretary.

Baboo Ramchunder Rao Mortund, Indore ;—proposed by the Secretary, seconded by Baboo Peary Chand Mittra.

R. H. Hollingberry, Esq., Calcutta ;—proposed by Mr. Agabeg, seconded by Baboo P. C. Mittra.

E. W. Gatfield, Esq., Mohenderpore factory, Purneah ;—proposed by Mr. W. G. Rose, seconded by Mr. A. H. Blechynden.

J. P. Hampton, Esq., Baraset ;—proposed by Mr. E. W. Wingrove, seconded by Mr. Griffiths.

The following presentations were announced :—

1. Selections from the Records of the Government of India, No. 15. *Presented by the Government of India.*

2. Four specimens of Cachar Tea. *Presented by T. H. Barry, Esq.*

3. Two specimens of Tea, one prepared from the wild Cachar plant, and the other from plants raised in Assam, from China stock. *Presented by F. Schiller, Esq.*

4. Sample of Cotton raised at Shahabad from foreign seed. *Presented by W. H. Poe, Esq.*

5. A further quantity of the bitter bark, of which a specimen was submitted at the meeting in July last, as also leaves and the fruit of the tree. *Presented by Lieut. R. Stewart, Commandant of the Kooky Levy, Cachar.*

In his former communication Lieut. Stewart mentioned that the bark of this tree is used extensively among the tribes of the Cachar frontier as a cure for fever and bowel complaints, and that it possesses a bitterness equal almost to the Peruvian bark. Dr. Thomson, to whom the specimens of leaves and fruit were referred, thus writes regarding them :—

"The specimens from Cachar of the bitter barked tree belong to a species of *Nauclea,* which is probably the *N. ovalifolia* of Roxburgh. I do not find that there is any record of any plant of this genus possessing febrifuge properties, but the genus belongs to the family of *Rubiaceæ,* and to the same division of the family with the *Cinchonas.*"

6. A box containing sample tea flowers, leaves, &c., from T. P. Larkins, Esq., Magistrate of Sylhet. Submitted by the Board of Revenue.

The Secretary stated that he had transferred this box to Dr. Thomson, who had kindly furnished him with a report on its contents.

Resolved—That a copy of this report be sent to the Board of Revenue, and that they be requested to obtain the further required information.

7. A quantity of pea seed raised at Azimghur from seed furnished by the Society. *Presented by A. J. Sturmer, Esq.*

8. Thirty kinds of English cabbage seed, and two plants, one of *Erythrina Hendersoni,* and another of *Metrosideros linearis.* *Presented by George Bartlett, Esq.*

9. Two fine specimens of Cocoanut and Linseed oil, and one of oil from the pericarp of the Cashew nut. *Presented by C. B. Wood, Esq.*

The Secretary submitted, for the inspection of the meeting, specimens of a substance resembling raw silk, which had been prepared from the bark of the mulberry tree by M. Frederic Lotteri, a gentleman who had recently arrived in Calcutta from Italy. He also laid on the table a copy of a little treatise in French by M. Lotteri on silk and paper prepared from the mulberry bark, and the proceedings (in the same language) for September, 1855, of "the Universal Society for the encouragement of Arts and Industry, founded in London in 1851," containing a paper giving copious details on the subject. A few cocoons of the Italian silk-worm, of inferior and best descriptions, were likewise submitted by M. Lotteri, the latter fully three times the size of the cocoon of the Bengal mulberry silk-worm.

On the motion of the Chairman, the best thanks of the Society were voted to M. Lotteri, for these interesting specimens.

On the recommendation of the Council it was *resolved* that Mr. Richard Dodd having failed to pay the arrears of subscription at the period of his resignation in January, 1855, his name be published as a defaulter, in accordance with the Rules of the Society.

Another recommendation was brought up from the Council, namely, an alteration of the latter clause of Section 4, Chapter 3, of the Rules as follows : for the words, " It shall be optional for any member to compound for the quarterly contributions by the payment of Rs. 400 to the funds of the Society," the words, " by the payment of Rs. 320 to the funds of the Society."

The majority of the members present having assented to receive this recommendation, it was resolved that it lie over for consideration at the next meeting.

Submitted the following Report from Mr. McMurray :—

" In drawing up my report for the month of September, I have first to state that out of the second batch of forty kinds of vegetable seeds received from the government garden at Ootacamund, only nineteen (19) of the sorts have germinated, and that of the two batches of Scotch vegetable seeds received from P. Lawson and Son, the one batch by the overland route, and the other round the Cape, the former packet contained sorts thirty-three; of which nineteen have germinated ; and the latter forty-one kinds, of which twenty-three (23) have come up.

" Of the thirty (30) sorts of vegetable seeds received from J. Carter and Co., of London, twenty-three kinds have yielded a better percentage generally than either of the above sorts. The whole of each consignment and sort above, which have germinated, have been sown a second, and some of them a third time, the result of which will be submitted in a tabular form for laying before the next meeting.

" Of Mr. S. P. Griffith's presentation of one case of plants from Java, containing in number thirty different sorts, seventeen kinds have arrived in good health, as will be seen from the accompanying list, and the other dead, among which it is to be regretted are the *Phalænopsis amabilis* and *Vanda tricolor*, two beautiful flowering and valuable orchids."

Mr. McMurray closes his report with the following :—

" *Calendar of Operations for the present and beginning of the next month.*

" *Conservatory and Flower Garden.*—Some of the more rare and pretty varieties of herbaceous perennial plants will, where started early into growth in the spring, be getting past their best, and beginning to show signs of going to rest ; among these is the several kinds of *Achimenes*, of which care ought to be taken, to point out to the *mallee* that the watering such plants should be gradually reduced, to allow the tubers naturally to go to rest, otherwise for the want of a proper knowledge of the habit of the plant, the *mallee* is sure to give a greater quantity of water than usual, under the impression that the leaves and stem of such plants are dying off for the want of that liquid.

"However, I am not to be understood to say that water should entirely be dispensed with at present, but on the contrary, there should be kept up a little moisture in the soil to ripen off the scaly tubers of such plants as the *Achimenes*, which can be accomplished by the end of November, at which time watering should entirely be done away with until the spring, at which time the tubers will again begin to push out buds.

"The bulbs of the *Lilium longifolium* recommended to be stored away in the pots in a dry corner of the Conservatory in my last, will be by this time pushing forth their buds, to which water ought to be given sparingly at first, and as the plants increase in size a more liberal supply should be given to insure a free action of the roots and vigorous growth necessary to the production of good flowers during the cold season and spring months, which cannot be otherwise expected.

"Dahlias under cultivation in pots will be suffering at this time from the action of the sun striking against and heating the sides of the pots in which they are growing. To obviate this have the pots plunged in an open border up to the rim and the space between the pots where they are standing filled up with leaves or other non-conducting material.

"Attend to the removing of annual seed gumlahs, as germination takes place, to the most light and airy situation of the Conservatory, otherwise the young seedlings will be sure to damp off: potting off of some of the more hardy kinds should also be going on as they increase in strength, such as balsams, zinnias, martynias, &c., &c., and attend to the watering of succulent plants in pots, and continue sowing in small quantities of annuals for a succession to fill up and keep the flower garden supplied with a stock of different kinds during the cold season and spring. Continue stirring and pointing flower beds and borders, and preparing soil (light) and top-dressing beds to receive annual and perennial plants, as soon as the rains are over, and keep the scythe going to keep down the grass short, and the broom clearing of leaves, &c., which are now beginning to fall.

"*In the Orchard* continue pointing the ground round young fruit trees, and the whole clear of leaves, and the grass as short as possible.

"*In the Kitchen Garden*, trenching should be forwarded, as in soil which is thoroughly loosened, the roots of all plants penetrate with freedom. Not only does this action take place, but water passes through with facility, and is followed by the air, which forms a most important office in reducing numerous fragments of shells, &c., &c., to pieces, and which in their turn yields the potash, soda, and other ingredients essential to the health and vigour of plants. Continue sowing in small quantities the several varieties of the *Brassica* tribe, lettuce, and other such seed, in order to have a good succession of plants for turning out at any time as the ground becomes vacant of other crops."

Additional pecuniary grant from the Hon'ble the Court of Directors.

Read the following letter from the Secretary to the Government of Bengal, and the Dispatch from the Hon'ble the Court of Directors, authorizing an augmentation of the donation heretofore granted by Government to the Society :—

" *To the Secretary to the Agricultural and Horticultural Society.*

" SIR,—Referring to your letter dated the 14th of September, 1855, to the *General.* address of the Secretary to the Government of India, Home Department, preferring an application to the Hon'ble the Court of Directors for additional pecuniary aid from Government in carrying out more efficiently the operations of the Society, I am directed by the Lieutenant-Governor to forward herewith a copy of the reply* received from the Hon'ble Court, which, it will be perceived, conveys sanction to the augmentation of the Government subscription to the Society from Rs. 2,620 to Rs. (5,000) five thousand per annum, "for the special purpose of enabling the Society to import larger supplies of seeds of a purely agricultural character for public distribution, a report being periodically submitted by the Society of the quantity of the seed imported and of the result of distribution."

" 2. The Society's careful attention is requested to the Hon'ble Court's wishes in respect to the submission, regularly, of the annual statement mentioned in the concluding para. of their Dispatch.

FORT WILLIAM,
Dated Sept. 20th, 1856.

W. GREY.
Secretary Govt. of Bengal."

Public Department, No. 65 *of* 1856.

Our Governor-General of India in Council.

" 1. We appreciate very highly the efforts of this Society for developing the Agricultural resources of India, both by the introduction of new seeds and plants, and by the extended production and improvement of those indigenous to the country.

Letter dated 12th Oct. (No. 37) 1855.

Application from the Agricultural and Horticultural Society of India for additional pecuniary aid, more especially for the purpose of importing Agricultural seeds for distribution to Public Officers and others throughout India.

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* Dispatch No. 65 of 1856, dated the 16th July.

"2. *It appears* that the operations of the Society are greatly limited by the want of sufficient pecuniary means, the annual income amounting on an average to no more than Rupees 23,000. Of this sum the contribution of Government (Rs. 2,620 per annum) may now be deemed incommensurate with the important objects of the Society. We accordingly authorize you to enlarge the grant to the Society to Rs. 5,000 per annum, for the special purpose "of enabling it to import a larger supply of seeds of a purely Agricultural character for public distribution." A report being periodically submitted by the Society "of the quantity of the seed imported, and of the result of distribution." We wish you to transmit to us, annually, in a tabular form, a statement, shewing the number of gardeners from the School, and of agricultural seeds and plants from the stores, consigned to the interior of the country.

We are, &c.,
(Signed,) W. H. Sykes,
" Ross D. Mangles,
London: and other Directors."
July 16*th*, 1856.

Resolved.—That the best thanks of the Society be tendered, through the Government of Bengal, to the Hon'ble the Court of Directors, for their liberal compliance with the Society's application.

Communications on various subjects.

The following papers were likewise submitted:—

1. From Secretary Government of Bengal, enclosing copy of a letter from the Secretary in the Military Deparment, of which the following is an extract:—

"The Right Hon'ble the Governor-General in Council having approved of a plan lately submitted for Soldier's Barrack Gardens, and for awarding prizes to successful competitors in raising flowers and vegetables, I am desired to request that the Horticultural Society in Calcutta may be addressed for the purpose of ascertaining whether they are able and willing to supply fresh Europe seeds of various kinds for the use of these Gardens, those furnished from Seharunpore being so inferior as to render it necessary to obtain them elsewhere.

"If the Society is unable to afford the assistance thus sought, they may, perhaps, undertake to procure them from England, and supply them at cost price.

"An approximate estimate of the quantity and kinds of seeds likely to be required has been called for and will be forwarded as soon as received."

The Secretary mentioned that this letter had reached too late to admit of a compliance, for this season, of that portion which referred to vegetable seeds; but that he had, after communication with the Garden Committee, expressed the ability of the Society to place a certain quantity of flower seeds at the disposal of Government, and further intimated the readiness of the Society to meet the request contained in the second paragraph, on receipt of the estimate referred to.

2. From S. H. Robinson, Esq., submitting a report on the samples of sugar-cane from Moulmein, which were presented at the last meeting by Mr. T. J. Butler :—

"I have examined the sugar-cane from Burmah which you gave me to report upon. It is of the red or Bourbon variety, and is a fine well grown, although I think not a *full* grown, specimen, for I believe the canes do not ripen on that coast until January or February, as in Bengal. I am confirmed in this opinion by an examination of the juice, which I find very watery, only indicating 7° of Beaume's sachorometer, instead of 9° or 10°, as from ripe Bengal canes. I should like to see some further specimens of this cane in its ripe state, for I believe the Burmese coast is very well adapted for cane cultivation.

"If the Society has any members located at Tonghoo or Prome they might probably be able and willing to furnish some interesting information, and also samples of the palm sugar produced in those parts. The American Missionary, Malcolm, whilst travelling up the Irrawaddy in 1856, mentions the very large production of jaggry from two kinds of palms, viz., *Cocos Nypa* and a *Borassus*, and he says there are several varieties of the latter genus cultivated. The jaggry, he mentions, was of good quality, and selling at "one-third of a penny per lb.," equal to about one rupee two annas per Calcutta bazar maund. Looking at the rising importance of date sugar in Bengal, the fact of an abundant supply of a similar product so near to us as the Irrawaddy is certainly worthy of further attention and investigation."

Resolved.—That the suggestion contained in the second paragraph of Mr. Robinson's report be acted on.

3. From Baboo Nobinchunder Doss, Secretary Local Committee of Public Instruction, Baraset, submitting, for the information of the Society, extract from the last year's general report of the Baraset School :—

"The Agricultural class attended the Farm and received lessons, especially in Botany and Chemistry for two-thirds of the year, and during the last four months, they have been allowed to devote their entire attention to the subjects of the annual examinations. To encourage this branch of education an attempt was made, though without success, to incorporate it with the Scholarship course for this School. The want of a suitable book on the agriculture of Bengal, was the chief cause of its failure. Dr. Thomson, Superintendent of the Hon'ble Company's Botanical Garden, whose opinion on a little work intended to serve as a text book, was requested, and who was solicited to choose another, in case that was not approved by him, wrote, in reply, as follows :—

"After pointing out the defects of the book submitted for his consideration, he goes on to say, 'I am sorry that I am not able to suggest any book which would be better adapted for the desired purpose than this. It is much to be desired that an elementary work should be prepared for this country, but I know no one fitted by experience in the Agriculture of India and England to undertake such a task,'—and so the matter dropped.

"With the chemical reagents and apparatus received from Government and some more purchased from the bazar, experiments on the properties of some of the elementary gases were shown to the students of agriculture. The microscope was also much used in exhibiting to them the internal structure of plants. In December last an examination was held in chemistry, and the result was satisfactory on the whole.

"The Garden is succeeding. A surplus is in hand, arising from the proceeds of the sale of its produce. The appointment of a better *Malee* than the present one, is in contemplation. The Cape vegetable seeds, supplied by the Agricultural and Horticultural Society, in August last, were all grown with success, excepting salsafy, thyme, and asparagus, which defied all the care that could be bestowed on them. Perhaps there was something wrong in these seeds. The distribution of seeds and young plants to the neighbouring ryots, has been made as usual. On the whole the Committee views the garden as by no means the least useful characteristic of the Baraset school."

4. From C. J. Wingfield, Esq., Commissioner of the Baraitch Division, province of Oude, dated 21st September. "My object in now addressing you," writes Mr. Wingfield, "is to ask you to send me two small packets of Irish and foreign flax seed, that I may sow them this cold season. I saw some flax on my arrival here in February last, which though sown thin, as natives always do, seemed finer than any I had before observed in India. The soil of this part of Oude is very rich indeed; vast tracts once highly cultivated have been deserted for years, the inhabitants having been compelled by oppression to fly, and rich soil which now bears nothing but grass, must be highly productive: moreover, the climate is damp and throughout the greater part, all, for instance under the hills, the water close to the surface, and the land so moist, that rain is scarcely required for the Rubbee crop. It is a country that evidently possesses great capabilities, but cultivation in every thing except rice is in a very rude state. Could you send me two or three dozen seeds of English wheat or more, I should like to make experiments with it. I should say the soil is admirably suited to indigo, indeed the only European whoever tried it made much money in that line. Shell-lac too is largely produced in the *Dâk* jungles."

The Secretary mentioned that he had forwarded to Mr. Wingfield a small portion of the Dutch and Riga flax seed recently received.

5. From George Jephson, Esq. Simla, submitting "Notes on the Premium offered [by the Society] for a new material for the manufacture of Paper." Referred to the Committee of Papers.

6. From Lieutenant J. F. Pogson, Simla, submitting for the patronage of the Society, a MS. copy of Sections two to six of his translation into Hindee of Johnston's Catechism of Agricultural Chemistry and Geology.

Resolved.—On the recommendation of the Council, that the Society subscribe for two copies of the work.

7. From A. Boyle, Esq., Acting Agent, E. I. Railway Company, applying for a quantity of Mahogany seedlings for planting along the line of Railway.

The Secretary intimated that this application had been met by the transfer to the Company of one hundred fine healthy plants, and the Agent had been requested to favor the Society hereafter with a report on their growth at the various localities in which they may be planted.

8. From Baboo Khettermohun Chatterjee, Secretary Public Library, Hooghly, applying for a set of the Society's Transactions, Journal, and Agricultural Miscellany in Bengali, for the benefit of their recently established institution.

Resolved.—On the recommendation of the Council that a copy of all the available publications of the Society be presented to the above Library.

For all the foregoing presentations and communications the best thanks of the Society were accorded.

(*Wednesday, the* 12*th of November,* 1856.)

W. G. Rose, Esq., Vice-President, in the chair.

The proceedings of the last general meeting were read and confirmed.

The gentlemen proposed at the last meeting were elected members, viz. :—

Lieutenant Geo. Weld; Messrs. E. S. Pearson, Civil Service; H. C. Richardson, Civil Service; G. W. Gale; H. E. A. Dunford; the Maharajah of Cooch Behar; Baboo Ramchunder Rao Mortund; Baboo Chunder Coomar Chatterjee; Messrs. R. H. Hollingberry; E. W. Gatfield, and J. P. Hampton.

The names of the following gentlemen were submitted as candidates for election:

C. B. Skinner, Esq., Civil Service, Muggoora;—proposed by Mr. Grote, seconded by Mr. Cantor.

H. R. Clark, Esq., Civil Service, Pooree;—proposed by Mr. J. J. Ward, seconded by Mr. E. A. Samuells.

E. Waterfield, Esq., Civil Service, Balasore;—proposed by Mr. Ward, seconded by Mr. Samuells.

G. E. South, Esq., Agent Beerbhoom Coal Company;—proposed by Mr. R. F. Ross, seconded by the Secretary.

The following presentations were announced:—

1. Geographical and Statistical Reports of ten districts of Bengal. *Presented by the Government of Bengal.*

2. Revenue Meteorological Statements of the N. W. P. from 1841-45 to 1849-50. *Presented by the Government of Bengal.*

3. A Manual of Gardening for Western and Southern India, by Dr. R. Riddell. *Presented by the Author.*

4. Mechanic's Magazine, Vols. 10, 26, 28, and 29. *Presented by G. Mercer, Esq.*

5. Two cases of plants from the Royal Botanic Garden, Mauritius, received from the Superintendent, Mr. James Duncan.

Very few of this fine collection have reached alive, the cases having been placed in the hold.

6. A few Cachar tea plants. *Presented by Lieutenant R. Stewart.*

Musters of Flax and Silk from the Punjab. *Presented by Major F. C. Burnett.*

Major Burnett writes—"These samples of silk and flax were both prepared in the usual way, the former from Cashmere looms and wound by Bengallee winders; the flax was grown in the Wuzeerabad district, and prepared by Natives under the superintendence of the Society: allowances must be made for a very bad season. I have sent a sample home, but I will feel obliged if you will let me know what is thought of it in Calcutta as well as its value, and that of the silk in the market."

8. Sundry samples of Flax raised in various parts of the Punjab, and of silk from cross breeds, on which he is desirous of a report. *Presented by H. Cope, Esq.*

The above specimens were referred to the Flax and Silk Committee.

9. A box containing the cocoons of Indigenous Tussur, and another silk producing moth of the Tenasserim Provinces. *Presented by Captain J. C. Haughton.*

10. Samples of raw flax and of canvas made therefrom. *Presented by Captain Ivie Campbell, Deputy Commissioner, N. Berar.*

"I have the pleasure," writes Captain Campbell in a letter from Booldana, dated 9th October,—"to advise you of the despatch of a parcel containing a small quantity of flax prepared in this district, and of two samples of coarse canvas made from it, the coarser variety by prisoners in the Jail. I am sorry I cannot tell you the price of the fibre, it was made by private individuals, competing for prizes offered by the Resident at Hydrabad. Although this district furnishes a large proportion of the linseed which is exported from Bombay, and last year there were more than 100,000 beegahs of land under the cultivation, the people were not aware that the plant, which is sown wide apart, for seed only, produced any fibre. The present is a mere experiment, and much could not be expected from it. Here linseed is a rubbee crop, and the sowings will commence immediately, so that I shall look out anxiously for the supply of Riga flax seed promised by you. As prizes will be again awarded this season I hope that a superior article will be exhibited."

The above samples were referred to the Flax Committee.

11. A large piece of the specimen of wood No. 2, submitted at the general meeting in August last, and which he thinks likely to answer for wood engraving. *Presented by Lieut.-Col. Swatman.*

12. Another specimen of wood, known at Beerbhoom as the ".Pakarmadoo" *(Gardenia latifolia)* submitted to compete for the prize offered for a substitute for Box. Received from O. W. Malet, Esq.

13. A small specimen of the Wood of the wild Pear (" Rujainth") of the Himalaya. *Presented by Lieut. J. F. Pogson.*

14. A further supply (10 seers) of Java tobacco seed. *Presented by Captain F. W. Ripley.*

The recommendation of the Council, which was laid before the last meeting, for reducing the amount for a life membership from Rs. 400 to Rs. 320, was brought forward, but could not be entertained in consequence of the requisite number of members not being present.

Defaulters to the Society.

The Council submitted for publication, in accordance with the Rules, the names of the following members as Defaulters to the Society, for arrears of subscription, viz :—

Mr. D. Cameron, Major R. Gill, Lieutenant E. K. O. Gilbert, and Mr. E. E. Dubus.

Nursery Garden.

Mr. McMurray's usual monthly report was submitted. He gives detailed statements of the result sowings of the vegetable seeds received this season as trial consignments from Messrs. P. Lawson and Son of Edinburgh, Messrs. James Carter. and Co., of London, and the second batch of seeds from the Ootacamund garden. The Scotch seeds have given an average germination of 40 per cent., the English seed 46 per cent., and the Ootacamund seed 35 per cent., of such sorts as have come up, more than one half having failed altogether. A report was also submitted from Mr. Sharp, Superintendent of the Barrackpore Park, of his trial sowings of the Scotch seed, which agrees pretty closely with those of the Society's Gardener.

In connection with the above, the Secretary submitted a letter from Dr. Thomson, enclosing one to his address from Mr. Scott, Head-Gardener H. C. Botanic Garden, (with certain tabular statements) reporting on a batch of vegetable seeds received in June last direct from Mr. McIvor of the Ootacamund Garden, which have resulted more favorably than those tried in the Society's Garden. The following is extract of Mr. Scott's letter :—

"Of the 36 sorts of seed received, 5 sorts have failed ; the failures amount to 13.88 per cent. The maximum obtained on 31 sorts which germinated is 100 per cent. the minimum is 5 per cent, and the average 51·45 per cent."

Mr. McMurray also gives the following calendar of operations for the present and beginning of the ensuing month :—

"Now is the season for forwarding the work in all departments of the garden. *In the Conservatory* the bedding out stock retained in pots during the rains and raised from seed sown during the months of August and September, will in some cases, be sufficiently advanced by this time to stand planting out into the open ground, where they are intended to flower ; but if all or any portion of the stock is not sufficiently large for this purpose, allow it to remain in the pots as much longer as may be deemed necessary, and see that nothing but strong plants are turned out that have been carefully hardened off to stand the sun ; as weakly ill-prepared stuff will be scorched by the sun, and cause a brown unsightly appearance about the ground, which may be avoided by a little precaution before turning the plants out of the pots.

"The violets under cultivation in pots should at this time be repotted into fresh soil, and the root divided at the same time in order to increase the stock, the whole of the violets succeed best when grown in a mixture of leaf mould, peat, and sand, with a little well decomposed cow manure, the whole being well mixed together before using, and the pot should be well drained.

"The several kinds of *Begonias*, *Abutilons*, *Gloxinias*, and other tender foliage plants, requiring tender treatment and the shade of the conservatory, should be kept constantly in a moist state, to maintain the young growth and healthy green appearance of the foliage, which will suffer by any neglect of this kind.

"*Achimenes*, and other like tuberous-rooted plants, which have done flowering, should be allowed to rest, by withdrawing the whole of the water from them until the spring, when they will again begin to grow. The *Oxalis*, where kept dry during the rains, will now begin to push out leaves, which should be encouraged by a liberal supply of water daily, and where the bulbs have increased to any great extent, a portion of them should be removed and repotted into a light rich soil.

"Be very careful to keep the seed gumlahs and pot plants well supplied with water, and where large plants are under cultivation in pots for exhibition at the flower shows, do not neglect to give plenty of manure water, as that will maintain a healthy green foliage and robustness of growth that cannot otherwise be expected.

"*In the Flower Garden and Shrubberies*, attention should be paid to the heading over and pruning in many of the plants which flower during the hot weather and rainy season, and at this time produces a bad effect in the belts and borders in which they grow, from the want of leaves and naked appearance ; among these may be classed the several kinds of Dwarf *Lagerstrœmias*, *Hibiscus*, &c., &c., and if the stock of each or any of the kinds be deficient, cuttings put down from the pruning, in a shady spot, will strike readily without any protection.

"The pruning of the roses should now be pushed forward without delay, and the cuttings put down in beds in a shady situation in the open ground where they will strike freely at this time. It is a difficult matter to lay down any rules for the guidance of the amateur on this subject, as many roses of the same group oft-times require very different pruning to bring the flowers to full maturity, and that at different seasons of the year; in fact to prune roses with any certainty of success we should know the character of each plant we are about to operate on; to enter into a detailed statement on this subject would occupy more time than I can conveniently spare at this busy season; but I propose furnishing a separate paper on it hereafter.

"Immediately after pruning, the roots of all kinds of roses should be carefully and only partly stripped, and left in that state for ten days, when they should be manured and covered in.

"All the common kinds of annuals where not already sown, should be put down in masses of from three to four feet square, as they are mostly loose growers, and easily knocked about by the wind, and when sown thick, one helps to support the other, and show to the greatest advantage their true character when in flower; and when the different colours are taken into consideration, before the seeds are sown, and nicely arranged, so as one colour may show off the other, the effect will be the more striking. The several kinds of verbenas, œnotheras, and other such bedding out stuff, should be turned out into the flower beds, which at this time should be filled up with all valuable plants fit for that purpose. Immediately after planting give sufficient water to settle the soil about the balls of the plants, and shade them should the sun be strong at the time, and for a few days after, until the plants have fairly established themselves in the new ground. Never forget neatness in removing leaves, &c., &c.

"*In the Fruit Garden* attention should be directed at this season to get the young shoots of the peach trees and vine plants repruned, and to check any after growth that may take place in old and established trees; this may be done by partly stripping the roots, but the greatest care should be taken that none of the small fibrous roots be destroyed in removing the soil, the best tool to use for this purpose is a fork, which should be carefully handled by a handy workman. The strawberry beds will require a top dressing with a light compost, which may be composed of leaf mould, peat, rough gravel, cow manure, and sand mixed in equal proportion; in such a compost as this the young runners will root freely, and produce strong young plants, which will produce fruit this spring, if attention be at once paid to this work.'

In the Kitchen Garden the main crop of carrots, parsnips, salsafy, scorzonera, beet, and other tuberous rooted plants, should be got in without delay; and attend to keeping up a succession of peas, by planting every week a small quantity, earth up and stake those above ground, and protect them from the ravages of squirrels, rats, &c. which are very destructive; but upon no account give water to the pea plant at any period of its growth; follow up the sowing of all crops as recommended in former calendars. Potatoes should now be planted, and the American corn; propagate all kinds of pot-herbs by cuttings and layers; recently transplanted cauliflowers, lettuce, &c., &c., must be carefully attended to with water, and take advantage of all cloudy days to transplant out the succession crop: irrigate whenever the ground becomes too dry for the *Brassica* tribe, and stir the surface of the ground among the crops to encourage vigorous growth, and to prevent weeds from making their appearance."

Cotton.

A report was submitted from the Cotton Committee (Messrs. Willis, Cowell, Blundell, and Douglas) on the various muster bales of cotton, the produce of Colonel Hannay's Plantation at Debrooghur, Upper Assam, which were received from the Board of Revenue, and submitted at a previous meeting. The Committee consider the cotton raised from acclimated Sea Island seed to be quite suitable for the English market, and the majority of the members value the better description at 15*d.* per lb. One of the samples from acclimated Pettigulph seed they also consider suitable for the English market.

Ordered, that a copy of this report be sent to the Board of Revenue.

Silk.

Read the following report of the Special Committee (Messrs. Willis, Rose, Grote, Huffnagle, Dr. Thomson and Baboo Peary Chand Mittra) appointed at a previous meeting to consider the subject-matter of the correspondence referred to the Society by the Government of India regarding the wild silk-worms of the Himalaya :—

"The Special Committee having carefully considered the subject matter referred to them, as contained in a correspondence between the Government of the North-West Provinces and Captain Hutton, respecting the wild silk-worms of the Himalayas, and having examined the specimens of cocoons and silk produced by *Bombyx Huttoni* (which have been recently received from Captain Hutton) beg to report :—

"1st. That silk of the best quality may be obtained from this cocoon, if properly reeled.

"2nd. That as *Bombyx Huttoni* is a native of the Western Himalaya, and thrives there during the rainy season, it must be more hardy as well as more tolerant of humidity, than the common silk-worm of commerce, which, as is well known, is so delicate, as to be seriously affected even by cloudy weather when about to spin its cocoon.

"3rd. That there are therefore good grounds for thinking that this worm may prove commercially important, and for recommending the Society to report favourably regarding it, and to express an opinion that further experiments on its cultivation and domestication, appear very desirable, and ought to receive Government support."

Resolved—on the recommendation of the Council, that a copy of this report be forwarded to the Government of India, in reply to Mr. Under-Secretary Chapman's letter.

Submitted a long and interesting paper from F. Bashford, Esq., Superintendent of the Surdah Silk Filatures, giving the result of his experiments at cross-breeding of indigenous silk-worms with Europe worms.

Resolved—that the best thanks of the Society be given to Mr. Bashford for his communication, and that it be transferred to the Committee of Papers for publication in the number of the Journal now in the press.

In a letter accompanying the above paper, Mr. Bashford expresses his readiness to distribute a few eggs of either a cross between French, Italian, or China, on the Bengal species, to any one desirous of rearing the worm and *promising to continue the experiments;* as Mr. Bashford adds, it has cost him much trouble and expense, which he would not wish thrown away.

Read the following letter from Captain Thomas Hutton at Mussooree, requesting information regarding the various descriptions of silk-worms, cultivated and wild :—

"I shall feel greatly obliged by your requesting the Society to permit the insertion in their Journal of the list of queries herewith furnished regarding the culture of silk. I am the more anxious on this subject, because I find that the Italian stock—which with you produces but one yield of silk in the year, will at Mussooree produce *two* yields,—eggs which I received from you early in the season having again furnished a second brood in August, and which is now thriving well.

"From this circumstance I am induced to think that the insect must have originally inhabited a colder climate than that of Bengal.

"I may likewise add for the information of the Society, that the worms known in Bengal under the names of Italian stock and Desee stock are in reality two distinct species; and as it may be difficult in the present state of confusion to determine to what particular species the name of *B. Mori* actually applies, I have placed myself in communication with Mr. Adam White of the British Museum, and requested him to furnish me with a description to serve as the type.

"I am confident the different worms hitherto passing as varieties of *B. Mori* are in reality all distinct species.

"*N. B.*—The species which I term Desee and Italian stock, are those furnished under those names by yourself."

Resolved—that the queries enclosed in Captain Hutton's letter be inserted in the next number of the Journal, and that they also form a portion of the proceedings of this day's meeting. The following are the queries in question :—

"1. At what season and month does the Italian stock of *B. Mori* hatch ?

"How many broods are there in a year ?

"Does the worm hatch at the same time in all districts and countries, whether European or Asiatic?

"Of what colour is the silk? Does the colour vary? What price is the silk per lb.?

"Whence was the original stock, and when introduced?

"2. The same questions in regard to the Desee worm.

"3. The same questions in regard to the Madrassee worm.

"4. The same in regard to the monthly worm.

"5. The same regarding the Arracan worm.

"6. Any information regarding the cross breeds. May not the white or pale worms occasionally found among the Italian stock, proceed from crossing?

"7. Are any of the above (supposed) varieties found in a wild state in any part of India?

"8. What is known of the species cultivated by or known to the Chinese? And do they distinguish the above named varieties as species, or do they consider them as one and the same?

"Are they all found in the same or in different districts of China? At what season and temperature do they respectively hatch there? In what climate? North or South? Hills or Plains? How many broods of each are there in a year? Is the silk mixed or kept separate? Are all under cultivation? Are any or all found wild? Are any of them fed upon other plants than the mulberry?

"9. What species of *Saturnia* and *Actias* are known and cultivated in China, and upon what plants do they feed? By what process is the silk of the cocoons of *Saturnia* and *Actias* unwound?

"10. Is the Cashmere and Affghan worm known in Bengal or China? Or whence is it, and when introduced?

"11. Is the supposed *Saturnia Atlas* of Moulmein, (where it is said to be common,) under cultivation? On what plant or plants does it feed? Will the silk unwind in warm water only? Is *Sat. Atlas* cultivated in China? On what does the insect there feed? How is the silk unwound?

"12. Is a dye extracted in India from the excrement of the caterpillar of *B. Mori*? And by what process? Is it valuable?

"13. If none of the varieties of *B. Mori* are now known in a wild state, whence did they originally come? If found wild, how is it that those under cultivation will not stay upon the trees when there placed?

"14. Does the caterpillar of *Sat. Cynthia*, the Eria, attach its cocoon to a branch by winding silk along the twig to some distance, so as to prevent its falling with the leaf? Does the caterpillar of *Sat. Atlas* do so?

"15. Can the eggs of cocoons of any or of all the Chinese species be procured for cultivation, or experimented in India?

"16. *Accurate* coloured figures of the caterpillars and moths of any silk spinning species will be thankfully received and duly acknowledged."

Read a letter from Signor Lotteri soliciting the aid of the Society in obtaining eggs and cocoons of the various silk-worms of India, with information regarding their habits, &c., with the view of enabling him to meet commissions from the Imperial Zoological Society of acclimitation of Paris and other Societies in Europe; and offering in return, to render any available information on kindred subjects, and on the advantages to be derived from his method of preparing the mulberry tree bark.

Resolved—that Signor Lotteri be informed that the Society will endeavour to meet the request conveyed in his letter to the best of its ability.

Read another letter from Signor Lotteri, in continuation of that submitted at the last meeting, in reference to his system for preparing silk and paper pulp from the bark of the mulberry tree. The Signor states that although it is only one year since he announced his system, four great Companies have already been organized in Europe for carrying it out. He adds that one Company has paid him the sum of £25,000 for his system; that the Government of Greece have given him a privilege for 15 years; and that at Beyrout a great undertaking is organized under his name to work it throughout Turkey under a Firman of the Sultan. He submits for the satisfaction of the meeting, certain documents, in original, to prove that he alludes to "accomplished facts."

In connection with the above, the Secretary submitted a translation from the French of a long and detailed report of a Special Committee of the "Universal Society for the encouragement of Arts and Industry," printed in the Annals of the Society for September, 1855, respecting the process invented by Signor Lotteri for the extraction of the silky fibres existing in the bark of the mulberry tree. Referred to the Committee of Papers.

Proposed introduction into India of the Quinine-yielding Cinchonas of South America

Read the following correspondence with the Government of India on the above important subject:—

To the Secretary to the Government of India.

Sir,—Referring to my letter of the 23rd February, 1852, to the Secretary to the Government of Bengal, and to the annexed extract from the report of a Special Committee, I have the honor by desire of the Agricultural and Horticultural Society of India, to re-submit, for the consideration of the Right Hon'ble the Governor-General of India in Council, the important subject of the introduction into India of the Quinine-yielding Cinchonas of South America.

2nd. By a reference made to the Superintendent of the H. C. Botanic Garden, it would appear that in consequence of the Society's previous communication, the Hon'ble the Court of Directors transmitted to that Institution six of these valuable plants, of which five reached in a living state; they were sent to Darjeeling, where only three arrived alive, and these three are known to have since perished, a result which was to be expected from the small number of plants sent, which did not admit of a trial at various elevations.

3rd. It is scarcely necessary, the Society conceive, to call the attention of Government to the very great advantages which would probably follow the successful introduction of the true Cinchonas into India. Not only, as has been justly observed, would a large product for export be added to the resources of the country; but, what is of far greater consequence in a philanthropic point of view, an invaluable, but at present costly, medicine, could be furnished to the people generally, at a comparatively trifling cost.

4th. The Society are of opinion that the best, and perhaps the only mode of action promising a successful result, is that recommended by Dr. Falconer in his paper published in the eighth volume of the Society's Journal, namely, the deputing of an intelligent and qualified Gardening Collector from England, for a couple of years, to South America, whose "attention should be mainly given to an exploration of the Cinchona forests in the different provinces, and to procuring an ample stock of young plants and seeds of all the best species." By this means the experiments could be conducted upon a sufficiently large scale to admit of a full trial, and with a wide range, of the different species. The small number of plants hitherto received has necessarily confined the experiment to one locality, Darjeeling, whereas, in addition to the hilly tracts around that Sanatarium, the cultivation of the plant should be attempted, as suggested by Dr. Royle, in the Khasyah hills, the mountains beyond Chittagong, and the hilly parts of Upper Assam; and in Southern India, in the Neelgherries, and the higher elevations of the Western Ghauts.

5th. This plan has already been adopted with success by the Dutch Government. In 1846, M. Migul, recommended to the Dutch Government to import the Quinine-yielding Cinchonas into Java. The Dutch Government, appreciating the value of the suggestion, sent M. Hasskarl to Peru on purpose to get plants. A ship-load of these plants was accordingly procured, and they arrived in 1854. Unfortunately many perished from the length of the voyage, but a sufficient number survived the voyage to furnish considerable plantations, and the success of the experiment seems certain.

6th. The mode of obtaining these plants as already proposed, would necessarily involve a considerable outlay of money, but the Society would respectfully observe, that the cost will be insignificant, when compared with the importance of the object. The same measure of liberality which promoted the mission of Mr. Fortune to China in 1848, for the express purpose of procuring the best varieties of the China tea plant for the Himalayan nurseries, will, the Society hope, be also extended for the deputation of a Collector to South America for obtaining such truly valuable plants as the Quinine-yielding Cinchonas.

A. H. BLECHYNDEN,
Secretary Agri-Horti. Society.

August 28th, 1857.

Extract from the Report of a Special Committee of the Agricultural and Horticultural Society dated June, 1856, submitted and adopted at a General Meeting held on the 11th June, 1856.

"*Quinine yielding plants.*"—The Committee being under the impression that any sum the Society could offer for the introduction of these valuable plants, would be inadequate, beg to recommend that another communication on the subject be made to the Government of India, in continuation of that preferred in 1852, and that the gold medal be added to any reward the Government may be disposed to offer to the introducer of a given number, not less than 20, of South American Cinchona, of the kind or kinds known to yield the best description of bark."

To A. H. BLECHYNDEN, ESQ.,
Secy. to the Agricultural and Horticultural Society.

SIR,—I am directed to acknowledge the receipt of your letter, dated the 28th August last, on the cultivation of the Cinchona tree in India, and in reply to state, for the information of the Agricultural and Horticultural Society, that the Hon'ble the Court of Directors will be moved to send a properly qualified Collector to South America to collect and bring to India a sufficient quantity of the best species of Cinchona. When the Hon'ble Court shall have expressed their views upon this proposal, the necessary enquiries can be instituted as to the sites in this country best suited to the plants.

2nd. The Governor of the Straits Settlements will also be requested to communicate with the Governor-General of Netherlands India, with the view of obtaining from His Excellency any information or suggestions which the recent experience of the authorities of Java may enable them to offer, both as to the parts in South America, where the best plants should be sought, and as to their culture in the East.

CECIL BEADON,
Secy. to the Govt. of India.

November 7th, 1857.

In connection with the above, the Secretary read a letter from Mr. Henning, Assistant-Surgeon, Oorai, enclosing copies of letters which he has recently received from medical men regarding the *Atees* as a substitute for Quinine. One of Mr. Henning's correspondents states he has "used the *Atees* in 108 cases in the Jail, selected on account of their severity, and it has cured or been of marked service in 65, and failed in 43: considering the character of the cases, I doubt if any other single remedy would have done any more. I have reported this officially to our Superintending-Surgeon and urged the adoption of the *Atees* as a standard remedy, *not equal* to quinine in all cases, but superior in some respects, curing often when quinine fails. In my own practice the cures have been 80 per cent; of course I do not consider *Atees* a panacea, it must fail sometimes as other remedies do, even quinine itself, but that it is *the* substitute for quinine there is not the slightest doubt in my opinion." Another correspondent observes:—"I have now tried the *Atees* in five cases that seemed to me very fair subjects for testing the powers of the medicine, one a European officer, the rest men of my regiment, in all of these cases it has answered remarkably well, and I am inclined to think it a very valuable febrifuge, and well worthy of an extensive trial throughout the country."

Communications on various subjects.

The following letters were likewise submitted :—

1. From R. Fortune, Esq., some interesting particulars respecting the Chinese mode of making the "Green Dye" so largely employed by them. Referred to the Committee of Papers.

2. From W. Grey, Esq., Secretary to the Government of Bengal, forwarding samples of Rheea fibre from Mr. Payter of Bogra, and requesting an opinion on their quality.

The Secretary intimated that Mr. Stalkartt, a member of the Flax Committee, having examined these samples, was of opinion that No. 1, is the better sample, and would answer for most purposes, whether for manufacturing into rope, or fine fabrics ; that No. 2, is well cleaned, but over-retted, consequently not so strong as No. 1 ; and that No. 1, is inferior in strength to the samples, submitted by Colonel Hannay and Mr. Nichol.

Ordered, that a copy of the above report be sent to the Government of Bengal in reply to their letter.

3. From Secretary to the Government N. W. P., intimating that the Lieutenant-Governor has much pleasure in complying with the Society's request for publication of its list of Premia in the *Government Gazette* of the N. W. P.

4. From Secretary to the Government of Bengal, to the same effect.

5. From G. F. Cockburn, Esq., President Public Library, Cuttack, applying for a set of the Society's *Transactions* for the Library.

Ordered, that a set of the Society's publications, as far as available, be forwarded to Mr. Cockburn.

6. From Captain F. W. Ripley, applying for a quantity of Sea Island cotton seed for trial at Chedooba and Aeng.

The Secretary intimated that no time had been lost in meeting this application.

7. From L. Bouton, Esq., Secretary Royal Society of Arts and Sciences. Mauritius, applying for seeds and plants of certain descriptions.

8. From Messrs. W. Rollisson and Sons, Tooting, forwarding, as desired, a trial collection of 6 parcels of flower seeds.

Ordered that a parcel be forwarded to the Society's Garden, to the H. C. Botanic Garden, the Barrackpore Park Garden, the Bhaugulpore and Berhampore Gardens, and the contents of the remaining parcel divided among such members as will give them a fair trial and communicate the result.

For all the foregoing communications and presentations the best thanks of the Society were accorded.

(Wednesday, the 10th December, 1856.*)*

W. G. Rose, Esq., Vice-President, in the chair,

The proceedings of the last general meeting were read and confirmed.

The gentlemen proposed at the last meeting were elected Members, viz. :—

Messrs. C. B. Skinner, Civil Service, H. R. Clarke, Civil Service, E. Waterfield, Civil Service ; and G. E. South.

The names of the following gentlemen were submitted as candidates for election :—

Dr. D. McL. Falconer, Civil-Surgeon, Amherst ;—proposed by Mr. James Morris, seconded by Mr. J. C. Murray.

Baboo Ramanauth Gossain ;—proposed by Mr. Joseph Agabeg, seconded by Baboo Peary Chand Mittra.

Captain C. W. Miles, commanding 3rd Regiment Oude Irregular Infantry ;—proposed by Captain G. W. Boileau, seconded by Dr. Thomson.

J. A. Charriol, Esq., Merchant, Calcutta ;—proposed by Mr. Joseph Agabeg, seconded by Baboo Peary Chand Mittra.

Captain Charles Burbank, commanding H. C. Steamer *Fire Queen* ;—proposed by Mr. J. Morris, seconded by Mr. Agabeg.

L. B. Oliva, Esq., Merchant, Calcutta ;—proposed by Mr. Agabeg, seconded by Mr. W. G. Rose.

Baboo Omachurn Mitter, Merchant, Calcutta ;—proposed by Mr. Agabeg, seconded by Baboo Chunder Coomar Chatterjee.

Dr. Brandis, Superintendent of Forests, Rangoon ;—proposed by Dr. Thomas Thomson, seconded by Mr. C. A. Cantor.

Aga Syud Hossein Shoostree, Merchant, Calcutta ;—proposed by Mr. Agabeg, seconded by Baboo Peary Chand Mittra.

E. C. Thorp, Esq., M. D., Civil Assistant Surgeon, Jessore ;—proposed by Mr. S. H. Robinson, seconded by Rev. J. Long.

The following presentations were announced :—

1. Statistical Reports (5) of certain districts of the N. W. Provinces. *Presented by the Government of the N. W. P.*

2. Royle's Fibrous Plants of India. *Presented by the Government of Bengal.*

3. Report on the Royal Botanic Gardens at Peradenea, Ceylon. *Presented by the Superintendent, G. H. K. Thwaites, Esq.*

4. Journal of the Asiatic Society of Bengal, No. V. of 1856. *Presented by the Society.*

5. A case of plants of *Restio tinctorum,* or thatch reed, of the Cape of Good Hope, which lasts for 20 years. *Presented by Messrs. C. M. Villet and Son.*

Messrs. Villet remark:—"We have two kinds at the Cape for thatching purposes, one requiring a marshy, and the other a moist and sandy soil.

The species sent requires the first mentioned soil, and we have no doubt they will answer in India, when exported in this manner. We have also sown a quantity of the seed in the case."

The Secretary mentioned that an indent had been made on Messrs Villet for plants of this valuable reed, in consequence of all previous attempts at raising it from seed having failed. (See a paper on the subject by Major Weller of the Engineers, published in the *Journal* of the Society, Vol. IX. Part II.) He regretted having to announce that these plants had all died during the voyage; and that none of the seeds had vegetated.

6. Specimens of Beeswax, caoutchouc, and maize from Darjeeling. *Presented by the Rev. Dr. Boaz.*

7. Specimens of fibrous substances from two hill plants and of paper made therefrom. *Presented by Captain David Briggs, Superintendent Hindustan and Thibet Roads.*

The following is extract of a letter from Captain Briggs, dated Simla, 25th September, regarding one of these substances :—

"I have the pleasure to enclose a specimen of a fibrous substance which I think, may prove an excellent material for the manufacture of fine paper. You will observe that the fibre is fine in quality, of tolerable strength, and when carefully collected, of a good colour. It is the under covering of the leaf of a small plant common in the Himalaya, and is generally used by the hill men even for tinder. When rubbed with charcoal and dried, it serves such a purpose excellently. The cost of collecting the fibre would be from 20 to 25 Rupees per maund."

The Secretary mentioned that he had informed Captain Briggs, that the substance in question was probably procured from the *Chaptalia gossypina*, but had requested him to send a specimen of the plant, and a much larger quantity of the woolly down, to enable a fair experiment to be made, as to its capability for manufacturing into paper. Captain Briggs had been kind enough to meet this request partially, and had also forwarded specimen of another fibrous substance, as referred to in the following extract of a subsequent letter, dated 28th November :—

"In compliance with your letter of the 4th October, I have now the pleasure to enclose dried specimens of the plant from which I obtained the fibrous subtance enclosed in my letter of the 25th September last, from which I think a fine description of paper might be manufactured.

"I regret that I cannot *this season* send you the two or three seers you require for experiment, the leaf having now withered, but will attend to your wish next year when the plant again arrives at maturity.

"I have also the pleasure to enclose two (2) specimens of paper manufactured from the fibrous bark of a '*Daphne*,' (I think,) found in abundance in certain parts of Konawur. Specimen No. 1 was manufactured by the Lama priests of Jungee, and besides being a tough, and tolerably well coloured paper, has the great advantage of being *indestructible* by *insects*. This I have proved during the past year, by keeping the specimen in a spot infested by the "fish" insect of the hills, where every thing in the shape of paper (except itself,) was destroyed. Specimen No. 2, was manufactured by some of my own establishment. In order that you may be able to identify the plant which produces this fibre, I enclose dried specimens of its leaf, flower, and fruit. The tree has much the appearance of the olive, but seldom attains the dimensions of either the Corfu or Italian olives. The wood is hard and fine in fibre, and could sufficiently large pieces be obtained, would, I doubt not, prove a fit substitute for box.

"By to-day's post I have sent you a few pounds of the fibre, from which you may be able to make experiments as to its application in the manufacture of finer paper, than that now forwarded.

"If found to answer in the manufacture of a marketable paper, any quantity of the fibre might be obtained."

Dr. Thomson, having been kind enough to examine the plants in question, thus writes regarding them :—

"The *Composita* is, as you suppose, Royle's *Chaptalia gossypina* called now *Oreoseris lanuginosa* D. C. The *Daphne*, is *D. mucronata*, Royle, which is, I believe, a synonyme of *D. oleoides* L., a plant of Crete and Asia Minor, extending through Persia and Affghanistan to the drier vallies of the Western Himalaya."

The Secretary added that there were several specimens of cloth in the Society's collection, made from the tomentum of this *Chaptalia*, which had been forwarded first by Dr. Falconer in 1836, again by Major Charlton in 1850, and lastly by Captain Lowther in 1855. He had requested Captain Briggs to favour the Society with a larger quantity of the *Daphne* bark as the supply received was not sufficient for a fair experiment.

The following articles from the Society's garden were also placed on the table :—

A. Seed of a new veriety of *Ipomœa* from Texas for distribution.

B. Sample of jute, which Mr. Stalkartt reports as being of such excellent quality that it is more adapted for mixing with silk than for making into rope.

C. 50 pods of *Vanilla planifolia*, of which further particulars will be found in the Gardener's report.

The proposal of the Council to reduce the amount of a life membership from Rs. 400 to Rs. 320, of which notice had been duly given, was brought forward and adopted.

The Council submitted for publication, in accordance with the rules, the names of the following ex-members who had failed to pay their arrears of subscription :—

Baboo Kistomohun Chowdry; Messrs. Walter Campbell; C. B. Taylor; J. B. Grisenthwaite; W. P. Downing; and F. Proby.

Nursery Garden.

A report from the Garden Committee was submitted recommending the outlay of a thousand Rupees for constructing new roads, repairing the old ones, procuring a roller and harrow, an additional quantity of galvanized wire fence, and repairing the conservatories. Further, an increase of hands to the establishment, to the extent of 50 rupees per mensem. The report was recommended for adoption by the Council, and approved of by the meeting, but, as it involved an outlay of money, it was resolved that it lie over till the next meeting for re-consideration.

The following report from the Gardener was also submitted :—

"In submitting my report for the month of November last I have first to state that only 49 out of the 85 kinds of the English flower seeds received from Messrs. J. Carter of London have germinated this season, some of this number have come up very freely, while other sorts but very indifferently; this batch of seeds was received in the garden on 4th September, and on the following day I had a portion of several of the varieties sown, the whole of which germinated very freely at that time; the *second portion* of the same seeds was not sown till the end of October; at this time, I had a very bad percentage of germination, although they were treated under equally as favourable circumstances.

"The batch of Ootacamund flower seeds of 53 kinds was received in the garden four days after the above, namely on 8th September, and the same result has taken place with this batch in every respect, while Messrs. Rollison's batch of 86 sorts of flower seeds received on 13th, and sown on the 21st November, have turned out so far very satisfactorily, as 64 out of the 86 kinds have already germinated very freely, and no doubt but more kinds will vegetate as the seeds have been only 18 days in the soil, which is not a sufficient length of time for many kinds of old or long kept seeds to vegetate.

"These facts are quite evident to show that the failure in some cases arises in this country from the dampness of the climate and the ravages of insects before the majority of the flower seeds can be sown with any certainty of success.

"I am of opinion that there should be two consignments of seeds to this country in the year, the one I would call the rainy season consignment, which should be landed about the end of May, and consist of nothing but *stove* annuals and perennials, and the other the cold season annuals, and perennials which should be landed about the 1st of November. Under such an arrangement I believe the result would be much better, as there cannot be any doubt but that Messrs. J. Carter's flower seeds are of the same years growth as those of Messrs. Rollison's, only that the former sent their seed too early by two months, and that the latter's seed arrived in the most favourable time for the majority of the seeds imported from England into this country to vegetate.

"I forward fifty *Vanilla planifolia* pods, from which it will be seen that there is a little improvement both in the size and curing of the fruit to that of any former year. Three of these fruits are numbered one, two and three; No. 1, was gathered when the pod was nearly all yellow and just beginning or had split a little at the end. No. 2, was gathered when the pod was pretty yellow all over, but at that time was not split; and No. 3, was gathered when the under end began to turn yellow. From these specimens it will be seen that Nos. 1 and 2 had been left on the tree too long, and owing to that the fruit has cracked, and consequently the fine scent is lost in a very short time; while No. 3 being picked just at the time the fruit began to show signs of turning or changing color, has not split and consequently will retain its scent longer. In the hot-houses of Europe the Vanilla pods are not supposed to be perfectly ripe or fit for picking before the fruit has hung on the tree for a 'year and a day;' but this system will not do for India, where in the course of time, there is little doubt but the fruit will be exported, instead of imported, as at present.

"I may here state for the information of the members, that the Tenasserim and Chota Nagpore yams are ready for issue, as also arrow-root tubers, besides a few thousands of cabbage plants."

Mr. McMurray adds his usual calendar of operations for the present and beginning of the ensuing month:—

"*In the Conservatory*, see that the seed gumlahs are well supplied with water, and kept in a constant moist state, as at this time all kinds of seeds should be well assisted to insure a quick germination and after-growth in the plants, continue the pricking out of the seedlings into other pots as the first pair of rough leaves are fairly formed, and set them out in an open place where the dew at night will reach the plants, although shaded from the mid-day sun; and, where the work has not already been done, attention should be paid to the directions for last month, and the work forwarded without delay.

"*In the Flower Garden*, those who delayed planting until the last week in November or beginning of December, will in some cases most probably have their beds and borders covered and filled up before those who planted out earlier, as the weather during the last ten days has been more favourable for that work; continue filling up the beds and borders as the stock increases with all available stuff; and where annuals have been sown in masses in the open ground, and have germinated freely, see that the plants are not too thick, as that will cause damping off, even in the open ground; when such is the case, thin out to proper distance, and plant the thinnings out in some other spot in the borders; continue a daily supply of water to all lately planted stuff and seeds that may be sown in the borders.

"Roses should be gone over at this time, and the buds wherever found too thick should be pinched off, as they will only weaken the plant, and produce no flowers; and attention should be paid to picking off the cospels as soon as the flowers wither, as they also rob the plant, and produce no seed at this season. See to the training of all kinds of climbing and twining plants as the growth takes place, as at this time well formed plants can be made without in the least checking the growth. Keep the scythes going and the walks well rolled.

"*In the Orchard and Kitchen Garden,* trees that have not got thoroughly established since planting out will be benefited by covering over their roots, which will be the means of preventing rapid evaporation, and keep the soil in a healthy moist state; and the same attention will be beneficial to all recently planted trees. The best material for this purpose is the short grass, leaves, and other such material, and if a little well decomposed manure be mixed with the whole, it will strengthen the tree and retain moisture longer than either of the other materials. See to keeping up a succession of salads, and continue sowing peas until the end of this month, after which time there is little chance of any sown after that time podding; also attend to keeping up a succession of French beans, parsley, celery, and other such stuff to furnish a supply in the spring. Plant potatoes in rows, leaving twenty inches between the lines and nine inches between the sets in the row, always choosing the largest and best description for the seed, which may either be set whole or cut with a single eye; the latter system should always be attended to for the first and last crops, as good sets put down with only one eye will come to maturity at least ten days before those which may be planted with four or more eyes."

In connection with the foregoing, statements were submitted from Mr. M. Betts of the result sowings of the Cape and Ootacamund vegetable seeds in the public garden at Berhampore. From these it would appear, that of 29 sorts of Cape seeds, 10 have not germinated, and one has only partially germinated; and of 35 kinds of Ootacamund seeds only 12 have germinated. The following extract of a letter from Mr. B. Warwick respecting Rollisson's and Carter's flower-seeds was likewise read:—

"I sowed the 20 packets of Rollisson's flower seeds as soon as I received them; the following is the result; 9 kinds have germinated very freely, 4 kinds very indifferently, and 7 kinds not at all. I only sowed a small number of Carter's flower-seeds supplied to me by the Society, but I must say they proved nearly worthless, and I hear the same opinion expressed every where; but I must tell you that my private supply sent out by Mr. Carter has turned out most excellent indeed, better than usual, hardly any having failed, and those principally of varieties that seldom do germinate freely in this country. Since I have had a garden in Calcutta I have never had so large and forward an assortment of annuals."

Resolved,—that the above letters, together with Mr. McMurray's report, be transferred to the Garden Committee for consideration when reporting on supplies of seeds for the next season.

Report on Flax raised at Allyghur from country seed.

Read a letter dated 11th October, from the Secretary Chamber of Commerce at Dundee, reporting on the bale of flax straw forwarded by the Society last year, being a portion of the supply sent down by Mr. Charles Gubbins from Allyghur, where it had been grown from native seed, and after the native fashion, solely for the sake of the seed.

Ordered, that a copy of the above be forwarded to Mr. Gubbins for his information.

Destruction by disease of the Bombay Sugar-Cane in certain districts of Bengal.

The Secretary next read extracts from a communication from Baboo Joykissen Mookerjee, submitting certain singular facts connected with the destruction of a variety of sugar-cane termed the Red or Bombay cane, in certain districts of Bengal.

Resolved,—that the best thanks of the Society be tendered to Baboo Joykissen Mookerjee for his interesting communication; that it be published *in extenso* in the *Journal,* and that portions of it be incorporated in the proceedings of this meeting, in the hope of eliciting further information on so important a subject.

Valuable properties of the "Atees" as a febrifuge.

In advising the despatch of a further supply of *Atees* powder, with the view of meeting an application from the Society for a large quantity for transmission to Mr. Hanbury of London, Mr. Henning, Sub-Assistant Surgeon at Oorai, in Bundelkund, gives the following additional particulars respecting its value as a substitute for Quinine :—

"I take this opportunity of stating for the information of the Society, that so steady and certain is the *Atees* in its operations, that I never think of using Quinine by any chance, and by not indenting for the latter (which has been the case for the last two years) I thereby have caused a saving to Government of a few hundred rupees a year in one district alone. Surely if I can do without Quinine in a district where fever of a severe character is very prevalent, other medical men could easily do without it also." In a subsequent letter Mr. Henning encloses a note from Dr. Balfour, Civil Surgeon at Delhi, applying for a further supply of *Atees* powder. Dr. Balfour remarks,—"I think my prisoners more healthy than usual this year, partly from the season, partly from the effects of the *Atees.*"

At the conclusion of the reading of the above letters, and after some discussion on the subject, it was proposed by the Rev. Mr. Long, seconded by Baboo Peary Chand Mittra, and *resolved*, that extracts from the various communications on the subject of *Atees* which have been submitted to the Society by Mr. Henning during the present year, be sent to the Government of Bengal, the Medical Board, the Apothecary-General, and the Inspector of Prisons, Lower Bengal, in the hope that it may be deemed worthy of further enquiry.

Read a letter from G. W. Thwaites, Esq., Superintendent of the Royal Botanic Garden, Ceylon, returning thanks for a set of the publications of the Society for the Library of the Kandy Agricultural and Horticultural Society. Mr. Thwaites adds—"I am glad to hear that you are making a move for the introduction of the *Cinchona* plant into India, and I trust an opportunity will be given me of trying it here, as I fancy it would succeed admirably upon our hills at an elevation of from 3,000 to 5,000 feet: and, if it should succeed here, as coffee has done, it might be distributed throughout India in a very short time."

For all the above presentations and communications the best thanks of the Society were accorded.

A. H. Blechynden,
Secretary.

REPORT

OF THE

Agricultural and Horticultural Society

OF INDIA.

Report from the Council to the Annual General Meeting of the 14th January, 1857.

THE close of another year in the annals of the Society calls for the usual outline of its proceedings since the submission of its Report in 1855.

According to the same order as that pursued on previous occasions, the internal economy of the Society claims precedence, and the Council commence as usual with a summary of the state of the subscription list. This they have much pleasure to record is satisfactory, the number of Members elected during the past year being 109; or 9 more than in 1855, and exceeding any year (except 1851) for the last 15 years: of these 23 are Civilians, 31 Merchants and Traders, 13 Indigo Planters, 22 Military Officers, 9 Medical Officers, 1 Clergyman, 3 of the Legal Profession, and 7 Native Members of the Community.

The following is the classification list of Members:—

CLASSIFICATION.	In 25 former years.	In 1846	In 1847.	In 1848.	In 1849.	In 1850.	In 1851.	In 1852.	In 1853.	In 1854.	In 1855.	In 1856.	Gross Total.	Total real number at close of 1856, after deducting lapses.
Honorary Members,	11	1	0	1	0	0	0	1	0	1	0	2	17	11
Associate Members.	2	0	0	0	0	1	1	0	0	0	0	0	4	2
Corresponding Members, ...	0	1	0	0	0	0	1	1	1	0	0	0	4	3
Civilians, ...	232	13	15	22	8	10	22	16	18	6	23	23	408	164
Merchants and Traders, ...	201	14	12	13	10	14	20	12	5	16	18	31	366	130
Indigo and other Tropical Agriculturists, ...	190	15	6	5	1	9	19	13	10	7	14	12	301	101
Military Officers, ..	160	10	11	11	11	9	34	18	22	19	26	22	353	160
Medical Officers, ..	80	0	2	3	5	7	4	5	3	4	6	9	128	35
Asiatics, ...	63	2	14	5	6	9	8	8	8	5	5	7	140	48
Clergy, ...	14	1	0	0	0	2	1	1	1	1	2	1	24	8
Law Officers, ..	40	1	0	0	6	4	6	3	1	3	6	2	72	23
Miscellaneous, ..	9	0	2	0	2	2	6	0	0	10	0	0	31	22
	1002	58	62	60	49	67	122	78	69	72	100	109	1848	707

In the lapses referred to in the last column, are comprised 15 deaths, 48 resignations, 5 defaulters,* and 8 whose names have been removed from the list in accordance with Section VI of Chapter III of the Bye-Laws, their absence from India having extended beyond four years; making in all 76.

Of the above-mentioned number, (707) 36 are members who have compounded for their subscriptions, 90 are absent from India, 16 are Honorary, Associate and Corresponding—in all 142; leaving 565 as the actual number of paying members at the close of the year, or 27 more than in 1855.

Among the members lost to the Society by death during the past twelve months, the Council regret having to record the name of Rajah Suttochurn Ghosall, who, on more than one occasion, held the office of a Vice-President. The Rajah was one of four Members who volunteered their assistance in 1845 to raise the sum necessary to enable the Society to take possession of their apartments in the Metcalfe Hall, and he advanced the sum of one thousand Rupees for two years without interest. The other Members deceased during the year are Baboo Aushootos Dey one of the oldest subscribers, Mr. P. Sutherland, another old subscriber, Mr. W. H. Poe, Baboo Nubocoomar Mullick, Mr. Archibald Grant, Baboo Kettromohun Mookerjee, Dr. McLean, Mr. Walter King, Capt. P. Salis, Messrs. William Watson, G. Hewett, J. C. Owen, F. H. Robinson, and Suprosaud Raj Muntree, of Cooch Behar.

Turning from this mournful subject, it is a source of gratification to the Council to announce that the Society has gained the countenance and support of the distinguished Nobleman at the head of the Government. The Right Hon'ble Viscount Canning has not only consented to become Patron, and Lady Canning, Patroness, but—following the example of the late Patron, the Earl of Dalhousie—his Lordship has intimated his intention of contributing to its funds an annual sum of five hundred Rupees.

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* The names of 11 have been published during the year as defaulters, but 6 of these were ex-members.

Allusion was made in the last Report to the loss the Society had sustained by the departure from India of their late President, Sir Lawrence Peel. To mark their sense of his services and of his encouragement of Agriculture and Horticulture, the Society have elected him an Honorary Member. The same mark of distinction has been accorded to Mr. Robert Fortune, in acknowledgment of the attention which he so readily bestowed on the various requisitions of the Society for plants, seeds, and useful information, during the last three years of his residence in China.

On the subject of finance the Council are again able to report favorably of the position of the Society. The annual statements of the receipts and disbursements, vested fund, arrears of subscriptions and liabilities, are submitted herewith. The total receipts during the year amount to Rs. 29,463-13-1, adding to which the balance in hand at the close of 1855, viz. Rs. 985-5-3, shews the total of receipts as per statement, Rs. 30,449-0-4. The disbursements during the year amount to a total of Rs. 29,236-2-1, which deducted from the receipts, leaves the balance of cash in the Bank of Bengal, and with the Secretary on 31st December, Rs. 1,212-14-3. The vested fund remains the same, namely Rs. 20,333-5-4. The liabilities of the Society amount to Rs. 5,659-15-0, for seeds obtained from England and North America, to meet this there is the amount due for arrears of subscription, for seeds, grafts, &c., and the cash balance, which form a total of Rs. 8,787-2-3.

Before quitting this subject, it may be mentioned, by way of record, that in consequence of the closing of the Government Agency, the Government Securities belonging to the Society have been transferred to the custody of the Bank of Bengal; also, that the amount for a Life Membership has been reduced from Rs. 400 to Rs. 320.

Three exhibitions of fruits, vegetables and flowers have been held during the year; the two first in January and March in the Auckland Garden, the third in April in the Town Hall, when 8 bronze medals, and Rs. 1,129, were distributed. The show of fruits and vegetables was fully equal, and the display of flowers superior to previous years.

The Council regret to state that the regular importations of vegetable and flower seeds have not proved equal to former years. The supplies of vegetable seeds from the Cape and North America have resulted indifferently, and the flower seeds from England have occasioned considerable disappointment, several kinds having entirely failed, while others have but partially germinated. This failure may have arisen from the consignment having arrived a month before the usual time—that is to say in the early part of September, during the rainy season, instead of the beginning of October. Measures will be taken to prevent a recurrence of this deviation from the usual course. Another small trial batch of vegetable seeds from Messrs. Lawson and Son of Edinburgh has likewise proved a failure; and the same result has attended a supply received from the Government Garden at Ootacamund in the Neilgherries.

In the agricultural department the Society has received and distributed the usual annual consignments of cotton, tobacco and maize seed. A large quantity of foreign (Dutch and Riga) linseed has also been distributed during the last season with the view, as stated in the last Report, of encouraging the growth of a superior description of plant for the sake of its valuable fibre. It may not be out of place to state here, that the report recently furnished by the Dundee Chamber of Commerce on flax straw received from the Allyghur district, is very encouraging, being considered a marketable article, and valued at £35 per ton. As this plant was raised from native seed, solely for the sake of the seed, and sown far apart after the native plan, it is not unreasonable to expect that a still more encouraging report will be furnished on another batch of straw which was sent to the Chamber in the middle of 1856, the produce of foreign seed and sown closer together for the sake of the fibre. The Chamber remark that there is evidently nothing in the soil and climate of the district (Allyghur) where this plant was grown, opposed to the production of flax that could be used by spinners generally in Great Britain.

In connection with this department, it is gratifying to the Council to be able to record that the Hon'ble the Court of Directors have granted a favorable reply to the application of the Society for an additional pecuniary grant, to enable them to obtain larger supplies of *agricultural* seeds for dissemination throughout the country. The Court have authorized the Government of India to enlarge the grant from Rs. 2,675 to Rs. 5,000 per annum.

In respect to the Nursery Garden it is satisfactory to state that the quantity of useful and ornamental plants, fruit-grafts and cuttings, distributed during the year, exceeds that of any previous season, being nearly 13,000, besides sugar-canes, a quantity of seeds and a large supply of bulbs and tubers. In the collection issued are several kinds of Chinese plants from the stock forwarded by Mr. Fortune in 1854-55, such as the wax-insect tree (a species of *Fraxinus,)* the green dye plant, funereal cypress, *Cryptomeria Japonica*, *Thuja* species, *Salisburia* and Hemp palm. The Vanilla plants have been also freely distributed, and 150 more added to the original stock, have been put down, with the view of fruiting and propagating from. The old stock has produced a fair crop of fruit during the past season, and so superior in size to those of previous years, that it has been determined to send them to England to obtain a report on their quality. A good many plants of *Amherstia nobilis* have been also recently issued, and more of this elegant tree will probably be distributed during next year. In the Orchard, the fruit trees have been freely propagated from, and more have been planted out, with the view of increasing the stock of such as have been found too limited to meet the annually increasing demand. To the portion of the Garden appropriated to economic plants, due attention has been bestowed, namely to tapioca, arrowroot, yams, cotton, Jubblepore hemp, and other fibrous yielding plants, such as *Sidas*, Jute, *Duncha*, and *Hibiscus* of several kinds, from which a large quantity of seed is being collected for sowing during the next rainy season. The Manilla hemp plant (*Musa textilis*) has been recently increased ; the Arracan and Burmah bast yielding plants have made a vigorous growth, and the Rheea plants have been largely distributed. The issue of many of the rarer kinds of ornamental plants has been delayed for a season, in consequence of the destruction, by the May gale, of the small *pucka* conservatory in which they were placed, by which many healthy specimen plants were destroyed. As the two other large conservatories afford sufficient space for the purpose of protecting tender plants and raising seeds, it has not been deemed necessary to rebuild this conservatory; but the materials have been employed for renewing the walks in the immediate vicinity. During the past year a small addition has been made to the Garden, by the transfer from the Botanic Garden of a small slip of ground on the Eastern side, which gives to the Society's Garden a better defined boundary.

The Council regret to add that the hope expressed in the last Report of a goodly addition to the School, of lads from the country, has not been fulfilled. The present state of the School is by no means satisfactory. The subject is at present under consideration by a Sub-committee of the Council, and it may therefore be premature to enter into details now, but the nature of their report, and the result of their suggestions, will be communicated in the next annual summary.

The offer of premia for certain subjects of general interest has, among other topics, occupied attention during the past year. There having been no competition for the prizes offered during 1854-55, it was determined to increase the number of prizes for the season 1856-57, and the Special Committee appointed to consider the subject, submitted their report at the July meeting. Though the details of that report have been widely disseminated through the medium of the Proceedings published in the various Newspapers, and in the *Government Gazette* of the various Presidencies, it may not be out of place to mention again, that the sum of rupees 1,500 has been offered for substitutes for hemp and flax, rupees 1,500 for the production of a certain quantity of Rheea fibre; rupees 1,500 for the best samples of cotton raised from exotic and indigenous seed; rupees 500 each for substitutes for Gutta Percha and Turkish Box, and the same sum for an efficient and economical substitute for the materials at present employed in India for manufacturing into fine paper. In addition to these, prizes of rupees 500 have been offered for the best practical essays on Indian oil seeds, Date tree cultivation, various Indian fibrous yielding plants, and the tanning products of India: further, a prize of rupees 600 for a Gardener's

Vade Mecum, applicable to Lower Bengal: in all the sum of Rupees 8,600, and 9 Gold Medals.

The important subject of the introduction into India of the Quinine yielding Cinchonas of South America, has again been reconsidered, and another application made to the Government of India with that object in view. The Government have intimated, in reply, that the Hon'ble the Court of Directors will be moved to send a properly qualified Collector to South America, to collect and bring to India a sufficient quantity of the best species of Cinchona. The importance of the object, in a philanthropic point of view, can be scarcely overrated; and though the expences attendant on the proposed mission may be great, the cultivation in our own territories of the tree in question, will, it is calculated, effect an annual saving of a large sum to the State in the course of a short time.* And here it may be mentioned that another drug, possessing similar properties to the Quinine, has been recently brought to the notice of the Society by Mr. Sub-Assistant Surgeon Henning, namely the "Atees," (*Aconitum heterophyllum* of Wallich,) a native of the Himalayas. The reports furnished by Mr. Henning on the valuable properties of this drug have been deemed so satisfactory, that the Society have thought it desirable to submit them to the notice of the proper authorities, in the hope that they may deem it worthy of further enquiry.

Several communications have been received from correspondents of the Society respecting various Indian materials considered likely to prove substitutes for rags in the manufacture of paper. To aid in this enquiry, the Society have forwarded through the Society of Arts, to the Chevalier Claussen, (who has evinced considerable interest in the subject,) several bales of the straw of certain grasses, such as the "Kusseeah" (*Saccharum spontaneum*, Lin:), "Wooloo"

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* In 5 years, 1849 to 1853, nearly £ 54,000 were expended by the Honorable East India Company upon Quinine and Cinchona bark in the three Presidencies of India. (See Report of the Medical Board published in the *Indian Annals of Medical Science*, Vol. III.)

(*Saccharum cylindricum*, Lamark), "Hooghla" (*Typha elephantina*, Roxb :), "Madooree Kattee" (*Cyperus tegetum*, Roxb :), and "Paddy" (*Oryza sativa.*) The Council hope to be able to announce in their next report whether any of these grasses contain the necessary ingredients for paper manufacturing, superior to the common rush of England.

Besides the above-mentioned subjects, a correspondence, equally as extensive as in former years, has been carried on with Members in various parts of India on other topics connected with the operations of the Society. Nor has it been confined to India; for, in addition to communications with other Societies in England, this Society has been in frequent correspondence with the London Society of Arts, with whom it has recently consented to be taken into Union, by the annual payment of two guineas. Among other advantages arising from this Union, the following may be particularized:—The productions or manufactures of India, transmitted by this Society, will receive all due publicity, by means of the exhibitions, publications and discussions of the Society of Arts. This Society will also receive the weekly Journal and other publications of the Society of Arts, who will likewise afford their advice and assistance in the event of this Society desiring to procure in England or France any scientific apparatus, and will obtain and furnish reports on any produce sent over for examination. It is as respects this last item that the Agricultural and Horticultural Society of India is likely to be most benefited by this Union.

Since the publication of the last Report another number of the Journal has been issued, namely Part 2 of Vol. IX, which contains several interesting papers. Part 3 is now in the Press, and will be published in the early part of 1857.

Another number of the *Indian Agricultural Miscellany* in Bengali, No. 6. has just issued from the Press, which completes the first volume: it contains 37 papers treating on the culture of arrowroot, tapioca, Guinea-grass, sugar-cane, safflower, senna, tobacco, flax, Rheea and other fibrous yielding plants; also articles in the Horticultural line, such as the culture of the peach, grapevine, and strawberry; potato, celery, artichoke and other vegetables: notices on the culture of the date tree and the manufacture of sugar therefrom, also of the teak tree, are introduced; with a few other articles on miscellaneous subjects. Nearly all the papers in the first five numbers are translations from the *Transactions* and *Journal* of the Society, but those in the last number are original articles. The Council conceive that the best acknowledgments of the Society are due to the Translation Committee generally, for selecting the papers for the volume in question, but more especially to Baboo Peary Chand Mittra, who has kindly performed the office of Editor, and to Baboo Shibchunder Deb, to whom the Society are indebted for the long and useful list of plants, extending over 70 pages, which forms an Appendix to this Volume.

Statement of Receipts and Disbursements of the Agricultural and Horticultural Society of India from 1st January to 31st December, 1856.

RECEIPTS.

From Members, Subscriptions collected during the year, ...	Co.'s Rs.			17,630	3	9
Government Annual Donation, ...	1,045	0	0			
Ditto, monthly allowance for 12 months at 135-13-6 per month, ...	1,630	2	0			
Ditto, being proportion of the difference between the present aggregate annual grants of the Government, and the new annual grant of Rs. 5,000, for a period of 3 months and 19 days of the current year of Rs. 2,324 14, ...	703	14	6			
The Right Honorable Lord Canning, annual donation, for the year 1856, ...	500	0	0			
				3,879	0	6
Accruings of interest on fixed assets, ...	...	...		1,105	5	4
Secretary A. and H. S. Punjab, towards payment of consignment of American vegetable seeds supplied to the A. and H. S. Punjab, by Messrs. D. Landreth of Philadelphia, in 1854, ...	2,500	0	0			
Ditto, to meet the cost of 300 parcels of English vegetable and flower seeds to be supplied in 1856, by Messrs. James Carter and Co. of London, ...	1,000	0	0			
				3,500	0	0
Proceeds of Sugar-cane delivered from the Nursery Garden, including cost of packing, ...	45	8	0			
Ditto, of fruit-tree grafts delivered from the Nursery Garden,	784	13	6			
Ditto, of a proportion of surplus Cape, American and Scotch vegetable and English flower seeds of 1855-56, ...	1,564	0	0			
Ditto, of American cotton seeds, ...	21	0	0			
Ditto, of copies of *Transactions* of the Society, ...	37	8	0			
Ditto, of copies of *Journal* of do.	68	14	0			
Ditto, of copies of *Indian Agricultural Miscellany*, ...	9	8	0			
Ditto, of sale of old seed boxes, casks, &c.	10	4	6			
Members, amount repaid for postages, pots, and packing charges for seeds, &c , ...	548	0	0			
,, Ditto, for glazed cases, &c., ...	209	2	0			
,, Ditto, amount of freight, &c , on boxes of seeds forwarded to their addresses in 1855-56, ...	50	8	9			
				3,349	3	6
Total Receipts, Co.'s Rs., ...				29,463	13	1
By Balance in the Bank of Bengal on 31st December, 1856, ...	970	10	6			
,, ditto in the hands of the Secretary on ditto, ...	14	8	9			
				985	3	3
Grand Total, Co.'s Rs., ...				30,449	0	4

DISBURSEMENTS.

FOREIGN VEGETABLE AND FLOWER SEEDS.

By Messrs C. M. Villet & Son for Cape garden seeds supplied in 1856,	2,070	0	0			
,, Messrs. D. Landreth, for American garden seeds, &c., supplied in 1854-55, ...	2,909	11	0			
,, Messrs. James Carter, and Co. in full of their bill, amounting to £129-8 for English vegetable and flower seeds, supplied to the A. and H. Society Punjab in 1856, ...	1,236	1	0			
,, Messrs. James Carter and Co. in full of their bill amounting to £253-13-6 for English flower seeds supplied in 1855, ...	2,486	4	6			
,, Messrs. Peter Lawson and Son in full of their bill amounting to £99-4-7 for vegetable seeds supplied in 1855, ...	947	13	9			
,, Ditto, in full of their bill amounting to £85-15-10 for linseed and seeds of field crops supplied in 1855-56, ...	822	8	4			
,, Messrs. D. Landreth of Philadelphia for American vegetable seeds supplied to the A. and H. S. of the Punjab in 1854, ...	2,220	0	0			
The purchase of 1½ seers of acclimated Agra Cauliflower seeds, ...	14	0	0			
,, Ditto, of 9½ Mds. of Saharunpore flax seeds, ...	18	1	0			
,, Ditto, of 6 cases of potatoes from Hobart Town, ...	30	0	0			
				12,754	7	7

LIBRARY.

By books purchased during the year for the Library, ...	389	10	9			
,, Binding books during the year, ...	25	8	0			
				415	2	9

PRINTING.

,, Sundr[illegible] for printing receipts and schedule of prizes for [illegible] shows, &c., &c., ...				94	0	0

JOURNAL.

,, Bishop's College Press, for printing Part 2 of Volume 9, ...	534	5	0			
,, Mr. G. H. Stapleton, for drawing and lithographing 1400 copies of plates for the Journal, ...	56	0	0			
				590	5	0

NURSERY GARDEN.

,, Ordinary expences incurred on account of the Nursery Garden from 1st December, 1855, to 30th November, 1856, ...	3,855	2	9			
,, Extra ditto, for purchase of fruit seedlings for grafting, for iron arbors and trellis work, for glazed cases, for pots, for widening and repairing roads, and for sundry other contingent expences, ...	1,212	5	9			
,, R. Fortune, Esq., being balance of amount due to him $64-19 for seeds, plants, &c., procured for the Society during his residence in China, ...	141	2	0			
,, Duty for a case of iron wire, ...	6	10	6			
				5,215	5	0

ESTABLISHMENT.

,, Amount for establishment from 1st December, 1855, to 30th November, 1856, ...				7,122	13	0

PECUNIARY REWARDS.						
,, Prizes to Mallees for vegetables and fruits at the exhibitions held on the 25th January, 1st March, and 4th April, 1856,	769	0				
,, Ditto to ditto, for flowers at ditto, on the 25th January, 1st March, and 4th April, 1856,	360	0	0			
				1,129	0	0
ADVERTISEMENT.						
,, Advertising in the Calcutta and Up-Country Newspapers, notices of general meetings, of shows of vegetables and flowers, distribution of seeds, offer of premia, &c., &c.,				340	1	0
A. AND H. SOCIETY, PUNJAB.						
,, Secretary A. and H. S. Punjab, to meet the cost of American vegetable seeds, &c., in 1855-56,				30	0	0
STATIONERY.						
,, Stationery for office books, &c., and for the use of the office,	89	4	0			
,, Brown packing paper for packing seeds,	66	0	0			
FREIGHT.						
,, Freight on boxes of seeds, books, &c., sent and received from the Cape of Good Hope, America, &c.,				271	1	9
METCALFE HALL.						
,, Society's proportion of assessment on Metcalfe Hall from November, 1855, to October, 1856,	131	4	0			
,, Sundry parties for various articles of furniture,	104	4	0			
				235	8	0
PETTY CHARGES.						
For sundry charges, including postage on letters, &c., sent and received, and copies of the Journal,	573	9	0			
,, Extra packermen for subdividing seeds,	31	14	0			
,, Soldering tin boxes and lining wooden boxes with tin,	37	15	9			
,, Expences incurred in putting up a fence round a portion of the Auckland Circus, for flower and vegetable shows for the season,	143	9	0			
By presents to Constables for attending at Horticultural and Floricultural Exhibitions during the year,	72	0	0			
,, Government Agent, for renewing notes and for his fees and commission during the year,	13	12	3			
For landing charges for linseed, &c.,	10	6	0			
				883	2	0
Total Disbursements, Co.'s Rs.,				29,236	2	1
By Balance in the Bank of Bengal on 31st December, 1856,	1,151	14	6			
,, Ditto in the hands of the Secretary on ditto,	60	15	9			
				1,212	14	3
Grand Total, Co.'s Rs.,				30,449	0	4

MEMORANDUM.

DISBURSEMENTS.

To Amount of Disbursements during the year 1856, as per Statement, ...		29,236 2 1
,, Balance in the Bank of Bengal on 31st December, 1856, ...	1,151 14 6	
,, Ditto in the hands of Secretary on ditto, ...	60 15 9	
		1,212 14 3
Total, Co.'s Rupees.		30,449 0 4

RECEIPTS.

By Amount of Receipts during the year 1856, as per Statement, ...		29,463 13 1
,, Balance in the Bank of Bengal on 31st December, 1855, ...	970 10 6	
,, Ditto in the hands of Secretary on ditto, ...	14 8 9	
		985 3 3
Total, Co.'s Rupees.		30,449 0 4

LIABILITIES.

Amount due by the Society for American seeds of 1856, ... Dollars, 1517—50=3,036 0 0	3,036 0 0	
Ditto for English flower seeds, of 1856, amounting to, ... £ 255=2,550 0 0	2,550 0 0	
Ditto for flower seeds of 1856, received from Messrs. Rollison and Son, amounting to, .. £ 6=60 0 0	60 0 0	
Ditto Balance of account with the A. and H. Society of the Punjab, ...	13 15 0	
		5,659 15 0

DEPENDENCIES.

Amount invested in Government Securities lodged in the Bank of Bengal, ...		20,333 5 4
Ditto of Subscription in arrear.	6,709 11 6	
Ditto of outstandings for seeds, grafts, copies of Journal, &c., ...	864 8 6	
		7,574 4 0

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LIST OF MEMBERS

OF THE

Agricultural & Horticultural Society

OF

INDIA.

DECEMBER 31*st*, 1856.

ALPHABETICALLY ARRANGED

AND

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Wilson, Thomas, Esq., Deputy Opium Agent, Ghazeepore,	1848
Wilson, H. R., Esq., Deputy-Collector, Budaon,	1852
Wilsone, C. M., Esq., Indigo planter, Munglepore,	1853
Wingrove, E., Esq., Merchant, Calcutta,	1846
Wingrove, G. W., Esq., Merchant, Calcutta,	1856
Wingfield, C. J., Esq., Civil service, Oude,	1855
Withecombe,† J. R., Esq., Medical Service,	1851
Wright, H., Esq., Shahpore, Punjab,	1854
Wood, J. N. T., Esq., Merchant, Calcutta,	1854
Wood,† Dr. Andrew, Medical service,	1852
Wood, C. B., Esq., Merchant, Calcutta,	1856
Wylie, Macleod, Esq., Judge Small Cause Court, Calcutta,	1844

Young, G. L., Esq., Indigo planter, Midnapore,	1845
Young, James, Esq., Civil service, Burdwan,	1856

LIST OF PREMIA FOR 1856-57.

The Agricultural and Horticultural Society beg to notify that they are prepared to award premia for the following articles, and for essays on certain subjects, to be submitted on or before the 31st December, 1857, subject to the conditions hereinafter detailed:—

I. PREMIA FOR CERTAIN ARTICLES OF RAW PRODUCE, &C.

FIBRES (SUBSTITUTE FOR FLAX).

For the production of any new vegetable fibre which can be successfully applied to all the purposes for which *flax* is now used, and of which not less than 10 maunds to become the property of the Society. Rs. 1,000 and Gold Medal.

FIBRES (SUBSTITUTE FOR HEMP).

For the production of a quantity of any vegetable fibre, which can be successfully applied to the purposes for which *hemp* is now used, and equally strong and durable, and of which not less than 10 maunds to become the property of the Society. Rs. 500 and Gold Medal.

FIBRES (RHEEA).

For the production of at least 25 maunds of Rheea fibre, the whole to be the produce of the party tendering it, and to become the property of the Society, to be accompanied by a detailed statement of the process followed in its cultivation, and after preparation and the cost of the same. The quality to be approved by the Society, and the fibre to be in a fit condition for the English market. Rs. 1,500 and Gold Medal.

N. B.—In the event of there being more than one competitor, the premium to be adjudged to the best specimen.

COTTON (EXOTIC) LONG STAPLE VARIETY.

For the production of at least 10 maunds of good merchantable Cotton raised from foreign seed of the BLACK-SEEDED LONG STAPLE kind. Rs. 1,000 and Gold Medal.

COTTON (INDIGENOUS).

For the production of at least 5 maunds of Cotton raised from indigenous seed, of a quality superior to that now exported, and such as is likely to prove a substitute for the Upland Georgia or New Orleans Cotton of the United States of America. Rs. 500 and Gold Medal.

N. B.—The producer or producers of the above cotton must submit to the Society a statement of the mode of cultivation and cost of the same.

SUBSTITUTE FOR GUTTA PERCHA.

For the discovery and production to the Society of any new substance, the produce of India, which can be successfully used as a substituae for Gutta Percha. Rs. 500 and Gold Medal.

MATERIALS FOR PAPER-MAKING.

To the producer of at least six maunds of fibre suitable for manufacturing into fine paper, such as will prove an efficient and economical substitute for rags or other materials at present employed in India for that purpose. Rs. 500 and Gold Medal.

QUININE-YIELDING PLANTS.

To the introducer of 20 healthy plants of Sonth America Cinchonas of the kind or kinds known to yield the best description of bark. The Gold Medal.

SUBSTITUTE FOR TURKISH BOX.

To the discoverer of any wood indigenous in India, and procurable in sufficient quantity, which shall serve as an efficient substitute for Turkish Box, especially for wood engraving. Rs. 500 and Gold Medal.

PREMIA FOR ESSAYS ON CERTAIN SUBJECTS.

1. For the best practical Essay on the production and relative cost of the various oil seeds of India, suitable for export. A premium of Rs.500.

2. For the best practical Essay on the present state of the cultivation of the Date Tree in Bengal, and on the best mode of increasing its production and improving the manufacture of its Sugar. A premium of Rs. 500.

3. For the best practical Essay on the present mode of cultivating and manufacturing Indian fibrous-yielding plants known in Commerce, such as Jute, Sunn, &c., with practical suggestions for their improvement. A premium of Rs. 500.

4. For the best practical Essay on the present mode of cultivating and preparing the various tanning products of India, with practical suggestions for their improvement. A premium of Rs. 500.

Rules for Competition.

1. The Essays must be of a practical character, containing the results of the Writer's own observations or experiments, and not merely a compilation from books.

2. Drawings constructed to a stated scale shall accompany writings requiring them.

3. All competitors to enclose their names in a sealed cover, superscribed only with their mottos, and the subject of the Essay.

4. The President or Chairman of the Council shall open the cover on which the motto designating the Essay, to which the premium has been awarded is written, and shall declare the name of the author.

5. The Chairman of the prize Essay Committee shall alone be empowered to open the motto paper of every essay not obtaining a premium, that he may think likely to be useful for the Society's objects, with the view of consulting the writer confidently, as to his willingness to place such Essay at the disposal of the Commitee of Papers for publication.

6. The copyright of all Essays for which a premium has been awarded, shall become the property of the Society for publication in their Journal or otherwise.

7. The Society are not bound to award a prize, unless they consider one of the Essays deserving of it, but may award such part of the premium as the Essay may be adjudged to deserve.

8. In all reports of experiments, the expences shall be as accurately detailed as practicable.

9. The Calcutta bazar maund of eighty sicca weight to the seer, and the Company's Rupee, are the only weight and currency in which calculations are to be made.

10. No prize shall be given for any Essay that has already appeared in print.

11. All Essays to be addressed to the Secretary of the Society, Metcalfe Hall.

PRIZE FOR A GARDENER'S VADE-MECUM.

To any person who shall produce on or before the 31st December 1857, the best practical treatise on gardening, as applicable to Lower Bengal, or a Gardener's *Vade-Mecum*, the sum of Rs. 600.

The work must afford full directions for the culture of vegetables, fruits and flowers, whether indigenous or such as have been introduced into Lower Bengal to the present time, giving practical hints on grafting, budding, pruning, and transplanting, with descriptions of soils and manures, best adapted to certain plants; a calendar of operations in the kitchen, fruit and flower garden, for every month throughout the year must be added, as also a copious alphabetical index.

CONDITIONS.

1st. The Society reserves to itself the right of withholding the above prize, should none of the treatises be approved of by the adjudicating Committee.

2nd. The Treatise to become the property of the Society for publication in its Journal, or otherwise as may be deemed fit: and one hundred copies to be placed at the disposal of the Author, free of charge.

UNIVERSAL ASSURANCE SOCIETY FOR LIVES.

ESTABLISHED IN LONDON AND CALCUTTA, 1834.

Confirmed by Special Act of Parliament 6 William IV. Chapter 64.

Invested Capital Pounds Sterling Six Hundred and Fifty Thousand, of which fifty Lacs of Rupees are held by the Indian Branch.

London Office, No. 1. King William Street.

Chairman.—SIR HENRY WILLOCK, K. L. S.

Indian Branch.

Directors.

WILLIAM H. SMOULT, ESQ.	GEORGE BARTON, ESQ.
CECIL STEPHENSON, ESQ.	GEORGE BROWN, ESQ.

JAMES JOSEPH MACKENZIE, ESQ.

Physician.—ALLAN WEBB, ESQ., M. D.

Agents and Secretaries.—MESSRS. BRADDON AND CO.

Madras Agents.	**Bombay Agents.**
MESSRS. BAINBRIDGE & CO.	MESSRS. LECKIE & CO.

The marked success which has for upwards of twenty years attended the operations of this Society, justifies the Directors in calling the attention of the public to the *following peculiar advantages* held out to all classes desirous of effecting Assurances on Lives.

1*st.* A LARGE ACCUMULATED AS WELL AS SUBSCRIBED Capital actually invested in sound and substantial Securities, amounting to upwards of Six Million five Hundred Thousand Rupees, of which a very large portion is held by the Indian Branch.

2*nd.* *An annual valuation* and investigation into the condition of the Society's affairs, *conducted most carefully on a sound and prudent basis,* by which the safety of the Institution is cautiously looked to, and the profits fairly and equitably distributed amongst the participating Policy-holders. Generally speaking, too little attention is paid by the public to the manner in which Life Assurance Valuations are made. Nothing is more easy than to *undervalue the Liabilities of a Society, and so represent the Profits as unusually large.* Such a process however attractive at first sight it may appear, must, if persevered

in, lead to the ultimate destruction of the Society, and the non-fulfilment of its promises. "Better a moderate profit with safety, than a large apparent profit taken out of Capital."

It is most satisfactory to the Directors of the Universal to be enabled to give assurance to the public, that the annual investigations of the Society have been made *for twenty years past*, with the utmost prudence and care, *and are based on long tested principles*, and on the *very safest Tables*, and it is not less satisfactory to be enabled to state that, notwithstanding this wise and proper caution, the profits of the Society have warranted very large annual abatements from the Premiums on participating Policies.

3rd. The Tables of Premium have been framed with the greatest care, and those applicable to Indian lives have been deduced from actual and reliable experience, obtained from [illegible] records of the India House.

It has recently been very much the practice to call for a considerable reduction in the Rates of Premium, both on Indian and English risks, and to patronize those Societies which offer the lowest terms. But *Security*, rather than a low scale of Premiums, should be the chief consideration with persons effecting Assurances on Lives. In this respect the Universal, from its large invested Capital, offers a most satisfactory guarantee for the due fulfilment of its engagements, and merits the special attention of the public.

4th. Proposals are received for Assurances for the whole term of life, either on the participating or on a non-participating scale, at a lower rate of premium. Also for short periods varying from one to seven years on very moderate terms.

5th. Following is an Extract of the rates of Annual Premium for an Assurance of Rupees one thousand.

CIVIL.

Age.	1 year.	3 years.	5 years.	7 years.	Life with profits.	Life without profits.	English rates.		
20	22	22	23	24	42	32	£1	18	8
30	27	28	28	29	48	39	2	8	10
40	32	32	32	33	59	49	3	3	0
50	38	40	40	43	74	62	4	5	6

MILITARY.

Age.	1 year.	3 years.	5 years.	7 years.	Life with profits.	Life without profits.
20	26	27	28	28	47	36
30	32	32	33	34	54	45
40	39	40	40	40	62	53
50	45	46	47	48	77	64

6th. On return of Assurers to Europe, their premium are immediately reduced to the English rates, both on the participating and non-participating scales, *corresponding with the age at which the Assurance was originally effected, and without reference to their state of health on arrival in England.*

If the Policy be according to the participating scale, the reduction arising from the profits is allowed on the English rate, thus admitting of a continuance of the Assurance in Europe on most moderate terms.

7th. Military Officers holding Civil appointments are allowed to subscribe at the Civil rate of premium, on notice being given to the Agents of the Society.

8th Premiums are payable either annually, half-yearly, or quarterly, and a grace of 28 days is allowed for such payments.

9th. Policies for the whole term of life, which have been in force for the full period of five years, will be purchased by the Society, or loans granted thereon to the extent of two-thirds of their estimated value.

10th. Medical Referees are remunerated by the Society, by the payment of a fee of Ten Rupees for each professional report on lives proposed for Assurance with this Institution.

11th. At the period of the last annual Valuation, the Assets of the Society were ascertained to be upwards of £650,000. The amount of Policies in force about £2,000,000, and the annual income upwards of £120,000.

Tables of rates, forms and instructions for effecting Assurances, can be obtained on application to the Secretaries, or to

Messrs. WALTER SMYTH and Co.,	Dinapore.
Messrs. HAMILTON, BROWN and Co.,	Mirzapore.
Messrs. GREENWAY BROTHERS,	Cawnpore.
DELHI BANK, & F. W. PLACE, Esq.,	Delhi.
J. WESTON, Esq.,	Meerut.
J. M. HAMILTON, Esq.,	Allahabad.
J. G. GORDON, Esq.,	Benares.
J. A. GIBBONS, Esq.,	Agra.
Messrs. IVES and Co.,	Futtehgurh.
Messrs. MACKINNON, HALL and Co.,	Ghazeepore.
H. DEAR, Esq.,	Monghyr.
A. CHRISTIAN, Esq.	Tirhoot.
MANAGER LAHORE CHRONICLE PRESS,	Lahore.
K. McIVOR, Esq.,	Mooltan.
Messrs. GEORGE DAWSON and Co.,	Rangoon Moulmein.
Messrs. SYME and Co.,	Singapore.
S. N. GREENE, Esq.,	Penang.
ROBERT S. WALKER, Esq.,	Hong Kong.

BRADDON & CO.,

Agents and Secretaries

CALCUTTA:
January, 1857.

UNIVERSAL LIFE ASSURANCE SOCIETY.

WHOLE LIFE.

Age	CIVIL.		MILITARY AND NAVAL.		ENGLISH RATES.		Age
	TABLE No. 3	TABLE No. 5	TABLE No. 4	TABLE No. 6			
	Annual Premiums required for the Assurance of 1,000 Rs. with participation in profits, and reduction of Premium on return to Europe	Annual Premiums required for the Assurance of 1 000 Rs. *without participation in profits, but with reduction of Premium on return to Europe*	Annual Premiums required for the Assurance of 1 000 Rs. with participation in profits and reduction of Premium on return to Europe	Annual Premiums required for the Assurance of 1 000 Rs. *without participation in profits but with reduction of Premium on return to Europe.*	Annual Premium for assuring £100, for the whole of life with participation in profits. Inserted as a guide to persons insured in India under Tables Nos. 3 and 4.	Annual Premium for assuring £100, for the whole of life without participation in profits. Inserted as a guide to persons insured in India under Tables Nos. 5 and 6	
18	41	31	45	34	1 17 2	1 13 6	18
19	42	32	46	35	1 17 11	1 14 2	19
20	42	32	47	36	1 18 8	1 14 10	20
21	43	33	48	37	1 19 6	1 15 7	21
22	43	34	49	38	2 0 5	1 16 5	22
23	44	35	49	39	2 1 4	1 17 3	23
24	44	36	50	40	2 2 3	1 18 1	24
25	45	36	51	41	2 3 3	1 19 0	25
26	46	37	51	42	2 4 4	1 19 11	26
27	46	38	52	43	2 5 5	2 0 11	27
28	47	38	53	44	2 6 7	2 2 0	28
29	48	39	54	45	2 7 8	2 2 11	29
30	48	39	54	45	2 8 10	2 4 0	30
31	49	40	55	46	2 9 11	2 5 0	31
32	50	41	56	46	2 11 0	2 5 11	32
33	51	42	57	47	2 12 3	2 7 1	33
34	52	43	58	47	2 13 7	2 8 3	34
35	53	43	58	47	2 14 11	2 9 6	35
36	54	45	59	49	2 16 5	2 10 10	36
37	55	46	60	50	2 18 0	2 12 3	37
38	56	47	61	51	2 19 7	2 13 8	38
39	58	48	62	52	3 1 3	2 15 2	39
40	59	49	63	53	3 3 0	2 16 9	40
41	60	51	64	54	3 4 9	2 18 4	41
42	62	52	65	55	3 6 6	2 19 11	42
43	63	53	66	56	3 8 3	3 1 6	43
44	65	54	68	57	3 10 2	3 3 2	44
45	66	55	69	58	3 12 2	3 5 0	45
46	67	57	70	60	3 14 5	3 7 0	46
47	69	58	72	61	3 16 9	3 9 1	47
48	70	60	73	62	3 19 4	3 11 5	48
49	72	61	75	63	4 2 3	3 14 1	49
50	74	62	77	64	4 5 6	3 17 0	50
51	76	65	79	67	4 9 1	4 0 3	51
52	79	68	81	70	4 12 10	4 3 7	52
53	81	71	83	73	4 16 11	4 7 3	53
54	84	74	86	76	5 1 2	4 11 1	54
55	87	76	89	78	5 5 10	4 15 3	55
56	89	79	91	81	5 10 10	4 19 9	56
57	92	81	94	83	5 16 2	5 4 7	57
58	96	84	98	86	6 1 10	5 9 8	58
59	99	86	101	88	6 7 7	5 14 10	59
60	103	88	105	90	6 13 2	5 19 11	60

⁂ Premiums are received in Half yearly payments for the convenience of the Assured but in case of death the full premium of the current year will be charged.

In the event of the parties whose lives are assured returning to reside permanently in Europe they will be reduced to the English rates from the date when their premiums first fall due after arrival.

Parties visiting England *on Furlough* or [illegible] will be required to pay the Indian premium during residence in England, without reference to the number of years the same may previously have been paid in India.

Parties assured in Company's Rupees in India, who [illegible] pay their future premiums in England will be required to pay them at the fixed rate of Exchange of Two Shillings per Company's Rupee, and in the event of such Assurance becoming a claim payable in England the sum assured will be paid at the same fixed rate of Exchange of Two Shillings per Company's Rupee.

INDIAN, LAUDABLE,

AND

MUTUAL LIFE ASSURANCE SOCIETY.

ORIGINALLY ESTABLISHED IN 1812.

REORGANIZED 1st JANUARY, 1840.

REDUCED RATES.

Passed by a Special Meeting of Policy-holders duly convened and held on 23rd June, 1856, as per Tables hereto annexed, to take effect on all Policies issued on or after 1st July, 1856.

DIRECTORS.

C. S. FRANCIS, Esq.
W. G. ROSE, Esq.
G. ACKLAND, Esq.
J. N. T. WOOD, Esq.
S. H. ROBINSON, Esq.
T. H. COWIE, Esq.
W. BLUNDELL, Esq.
A. H. BLECHYNDEN, Esq.
AND
G. B. ROBINSON, Esq.

STANDING COUNSEL, ..	T. HARDWICKE COWIE, Esq.
BANKERS,..	BANK OF BENGAL.
MEDICAL OFFICER, ..	J. GREGORY VOS, M.D.
SOLICITOR, ...	HENRY SWINHOE, Esq.
SECRETARY, ...	J. S. SMITH, Esq.
AUDITORS, ...	C. N. COOKE & W. DUNCAN, Esqs.

Office, No. 7, Hastings' Street, Calcutta.

GREATLY REDUCED

Annual Civil RATES for insuring Rupees 1,000,

In the Laudable and Mutual Assurance Society.

Age next Birth Day.	Years.							Life with profits divisible every 3 years.	Age next Birth Day.
	1.	2.	3.	4.	5.	6	7.		
20	22	22	22	23	23	24	24	29	20
21	22	22	23	23	24	24	24	30	21
22	23	23	24	24	24	24	24	31	22
23	23	24	24	24	24	24	25	32	23
24	24	24	24	24	25	25	26	32	24
25	24	24	24	24	25	25	26	33	25
26	24	24	25	25	26	26	27	33	26
27	25	25	26	26	27	27	28	34	27
28	26	26	27	27	28	28	28	34	28
29	27	27	28	28	28	28	28	35	29
30	27	27	28	28	28	28	29	36	30
31	28	28	28	28	29	29	29	37	31
32	28	28	29	29	29	30	30	39	32
33	28	28	29	29	30	30	30	40	33
34	28	29	29	30	30	31	31	42	34
35	30	30	30	30	31	31	31	43	35
36	30	30	30	31	31	32	32	44	36
37	31	31	31	31	32	32	32	45	37
38	31	31	32	32	32	32	32	47	38
39	31	32	32	32	32	32	32	47	39
40	32	32	32	32	32	32	33	48	40
41	32	32	32	32	33	33	34	50	41
42	32	32	32	33	34	34	35	51	42
43	33	33	34	34	35	35	36	52	43
44	34	34	35	35	35	36	36	53	44
45	34	35	35	36	36	37	38	54	45
46	35	35	36	36	36	37	39	55	46
47	36	36	36	37	38	39	40	56	47
48	36	36	37	38	39	40	40	56	48
49	37	38	39	39	40	40	42	57	49
50	38	39	40	40	40	41	43	59	50
51	40	40	40	41	42	43	44	60	51
52	40	41	42	43	44	44	45	62	52
53	42	43	44	44	44	46	47	65	53
54	43	44	44	45	46	47	48	66	54
55	44	45	45	47	48	48	48	67	55
56	45	46	47	48	48	49	50	69	56
57	46	48	48	49	50	51	52	72	57
58	48	48	50	51	52	52	54	73	58
59	49	50	51	52	54	56	56	76	59
60	51	52	52	54	56	58	60	80	60

Medical Fees for Certificates of Health granted in the Mofussil, will be paid by the Society, *viz.* Rs. 8, on all risks submitted.

GREATLY REDUCED

Annual Military and Naval RATES for insuring Rs. 1,000,

In the Laudable and Mutual Assurance Society.

Age next Birth Day.	YEARS.							Life with profits divisible every 3 years.	Age next Birth Day.
	1.	2.	3.	4.	5.	6.	7.		
20	26	27	27	28	28	28	28	35	20
21	27	28	28	28	28	28	28	36	21
22	28	28	28	28	28	29	29	36	22
23	28	28	28	29	29	30	30	37	23
24	28	28	28	29	29	30	30	38	24
25	28	29	29	30	30	31	31	38	25
26	29	30	30	31	31	32	32	39	26
27	29	30	30	31	31	32	32	39	27
28	30	31	31	32	32	32	32	40	28
29	31	32	32	32	32	33	33	41	29
30	32	32	32	32	33	34	34	41	30
31	32	32	33	33	34	35	35	42	31
32	32	33	34	34	34	36	36	42	32
33	33	34	35	35	36	36	36	43	33
34	34	35	36	36	36	36	37	44	34
35	35	36	36	36	37	37	38	44	35
36	36	36	36	37	37	38	38	45	36
37	36	37	37	38	38	39	39	46	37
38	37	38	38	38	39	39	40	47	38
39	38	39	39	39	40	40	40	47	39
40	39	39	40	40	40	40	40	48	40
41	40	40	40	40	40	41	41	50	41
42	40	40	40	41	41	42	42	51	42
43	40	40	41	41	42	42	43	52	43
44	41	41	41	42	43	43	44	53	44
45	42	42	42	43	43	44	44	54	45
46	43	43	43	44	44	44	44	55	46
47	43	44	44	44	44	45	45	56	47
48	44	44	44	45	45	46	46	56	48
49	44	45	45	46	46	47	48	57	49
50	45	46	46	47	47	48	48	59	50
51	46	47	47	48	48	48	49	60	51
52	47	48	48	48	49	50	50	62	52
53	48	48	49	49	50	51	52	65	53
54	49	49	50	51	52	52	52	67	54
55	50	51	51	52	52	53	53	70	55
56	51	52	52	53	53	54	55	72	56
57	52	53	53	54	55	56	56	74	57
58	53	54	55	56	56	57	58	77	58
59	54	55	56	57	58	60	60	79	59
60	56	56	57	59	60	62	64	82	60

☞ Medical Fees for Certificates of Health granted in the Mofussil, will be paid by the Society; *viz.* Rs. 8, on all risks submitted.

PECULIAR ADVANTAGES.

This Insurance Company is the oldest established in India and the only one in Calcutta, offering the advantages of a Mutual Assurance Society. It is under the management of a Board of nine Directors who meet once a week, and a Secretary.

The Society has Agents at the other Presidencies, the Colonies and at the principal stations in the Lower and Upper Provinces. The Directors desire to invite the attention of the Public to the real and solid advantages which the adoption of the new Rules and Rates now published as taking effect from 1st July 1856, presents to them.

1.—The Rates charged on all Policies issued from this date are at a much reduced and fixed figure, not subject to any fluctuation.

2.—The Rates will be found in comparison with other Tables to be *Lower* than those of any other Assurance Office in India, which fact cannot fail in itself to commend the Laudable Society to a fair participation in public and private support.

3.—This Office being a Society founded on the acknowledged and sound principles of Mutual Assurance divides the whole of its profits amongst the Assured, whereas other Institutions work for the benefit of a separate and distinct Proprietary body.

4.—The Security afforded by its large capital, at present exceeding 8 Lacs of Rupees, is not nominal, but the whole is invested in Government Securities in the names of all the Directors.

5.—On satisfactory proof of death, Policies are adjusted and paid one month afterwards without any deduction for discount.

6.—Policies are granted for various limited periods from one year to seven years, and also for the whole duration of Life at fixed rates of Premium.

7.—An Insurer, after one year's residence in Europe, or other country approved by the Directors, is entitled to a reduction of 10 per cent. on these rates.

8.—To suit the convenience of Policy-holders, Premium will be received quarterly or half-yearly.

9.—Military Officers holding Civil Appointments, are charged at Civil rates whilst so employed.

10.—Rules, complete sets of Tables of Rates, Blank Forms of Application and Certificates, are always obtainable at the Office of the Secretary, who will effect Insurance free of charge. No fee required for the Certificate of the Society's Medical Officer.

Agents appointed to receive applications and to furnish the requisite forms :—

ALLAHABAD, ...	*H. Archer, Esq.*
AGRA, ...	*Messrs. Hulse and Nephew.*
BENARES, ...	*Dr. E. J. Lazarus.*
BOMBAY, ...	*Vacant.*
CANTON, ...	*Vacant.*
CAWNPORE, ...	*Messrs. Greenway Brothers.*
COLOMBO, ...	*Messrs. A. Heale & Co.*
DACCA, ...	*Vacant.*
DELHI, ...	*J. Balfour, Esq.*
DINAPORE, ...	*Messrs. Charrier & Co.*
MEERUT, ...	*A. Bryson, Esq.*
MIRZAPORE, ...	*Messrs. Hamilton, Brown & Co.*
MOULMEIN, ...	*Messrs. Todd, Findlay & Co.*
RANGOON, ...	*Messrs. Begbie & Co.*
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